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The Reserve Force Policy Screening Models (POSM)

A User's Manual

Jennifer H. Kawata, David W. Grissmer,
Richard Eisenman

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This report is a user's manual for the Reserve Force Policy Screening Models (POSM), which consist of 48 separate models. Eight separate models for each of the six reserve components include three officer and three enlisted models covering military technicians, full-time personnel, and part-time personnel; a fourth pair contains an aggregate of all three types of personnel. Each personnel inventory projection model incorporates behavioral and nonbehavioral options for projecting force sizes into the future. The models incorporate personnel flow into and out of the force, among the different personnel groups (full-time, military technician, and part-time), and into different year-of-service groups. They can project 14 years or more into the future, using assumptions about end strength or accession levels. The models were built to support a wide range of decisions concerning reserve pay, bonus budgets, recruiting resources, and issues of reserve force growth.

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Jennifer H. Kawata, David W. Grissmer,
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PREFACE

This report provides guidance to users of personal-computer-based personnel inventory projection models for the six Selected Reserve Components. The Reserve Force Policy Screening Models (POSM) consist of 48 separate models: four for officer and four for enlisted personnel, for each of six reserve components. Three of the four models for each of the officer and enlisted components consist of separate models for military technicians, full-time personnel, and part-time personnel; the fourth model contains an aggregate of all three categories.

The models were built to support a wide range of decisions concerning reserve pay, bonus budgets, recruiting resources, and issues of reserve force growth. As such, the models should be of interest to manpower analysts in both the Office of the Secretary of Defense and the services who are concerned with reserve manpower planning. The models provide a high degree of flexibility to the user. As a result, the user must be something of an expert with the models to get the most out of them and to make accurate projections.

The user should be well versed in the fields of data analysis, cohort-survival models, and military personnel accounting systems. In addition, the user should have some experience with personal computers and LOTUS 1-2-3 (version 2.01).

Because of the degree of training necessary to run the models correctly, model disks will be provided only to users who have participated in a one-day training session provided by the authors.

The research was sponsored by the Joint Chiefs of Staff (JCS); the Office of the Assistant Secretary of Defense, Reserve Affairs; and the Office of the Assistant Secretary of Defense, Force Management and Personnel. It was also supported by research funds made available by the latter two offices for the Sixth Quadrennial Review of Military Compensation. The report was prepared within RAND's Defense Manpower Research Center. The Center is a component of RAND's National Defense Research Institute, a Federally Funded Research and Development Center sponsored by the Office of the Secretary of Defense.

SUMMARY

This report is a user's manual for the Reserve Force Policy Screening Models (POSM), which consist of 48 separate models. Eight separate models for each of the six reserve components include three officer and three enlisted models covering military technicians, full-time personnel, and part-time personnel; a fourth pair contains an aggregate of all three types of personnel.

Each personnel inventory projection model incorporates behavioral and nonbehavioral options for projecting force sizes into the future. The models incorporate personnel flow into and out of the force, among the different personnel groups (full-time, military technician, and part-time), and into different year-of-service groups. They can project 14 years or more into the future, using assumptions about end strength or accession levels.

POSM can develop future projections under either of two assumptions. If end strength assumptions for future years exceed the number of supply-constrained "first-choice" accessions, the difference will be made up by the demand-constrained "second-choice" accessions. That is, the models will take retention rates and first-choice accessions as specified by the behavioral or nonbehavioral equations and will fill in with second-choice accessions in each year until end strength is met. The user can specify the characteristics of the first- and second-choice accessions. First-choice accessions are those groups that are supply-constrained by current compensation and benefit levels. Second-choice accessions are demand-constrained groups—supply exceeds demand and service policies dictate the number admitted.

Alternatively, the user can specify the number of first- and second-choice accessions in future years along with future retention rates, and the model will allow end strength to float to the level implicitly specified by these assumptions. In this mode, the model predicts end strength levels resulting from specified accession and retention policies and economic assumptions.

The model has three flexible projection options for specifying future prior- and nonprior-service accession levels and continuation rates. These options are "simple ramp" techniques, linear and logistic regression, and exponential smoothing.

Simple ramp techniques allow the user to specify a long-term constant value of projections with a variable number of transition years. The long-term values can be specified by simple functions of past

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or



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historical values. These functions include any linear combination of historical averages and standard deviations. These functions can include only the most recent year or any set of contiguous historical years.

The regression function can be linear or logistic. The user can specify which variables to include in regressions from a user-specified table of 20 independent variables. Different regressions can be specified for each matrix row. Projections are made using the future values of the independent variables specified in the regression table. These future values can be changed and all projections automatically recalculated using current regression equations. Using this option, projections based on different military pay or unemployment assumptions are simple to perform.

A single exponential smoothing option is also provided which automatically calculates an "optimal" smoothing coefficient.

The model has four main modules: HISTORIC, DECISION, PROJECTION, and REPORTING.

- The HISTORIC INVENTORY MODULE contains the historical data on nonprior- and prior-service accessions and continuation rates. It is designed to allow the user to quickly scan and graph any time series data for any group, so as to determine the size and historical trends in key manpower groups.
- The DECISION MODULE controls the choices of projection methods for accessions and continuation rates. It allows the user to move to any group, choose a projection technique, and evaluate the results of that projection technique graphically.
- The INVENTORY PROJECTION MODULE takes the recent year inventory and applies the projected accession and continuation rates to give force projections. End strength choices are made in this module.
- The REPORTING MODULE accepts up to two projections and allows automated graphing of comparative force profiles and year-of-service groups.

The model is implemented on an IBM AT compatible computer using LOTUS 1-2-3 software (version 2.01). To make it user-friendly the model makes extensive use of the 1-2-3 macro language. The user is always presented with menu choices in making modeling decisions and choices, but he may also use 1-2-3 to perform supplementary analysis that can be integrated with the models. Additional hardware needed includes two megabytes of expanded (above-board) memory meeting the LOTUS/INTEL specifications; a math co-processor; a 10 megabyte hard disk; and 640 K RAM.

The user is assumed to have experience with personal computers and working knowledge of LOTUS 1-2-3. In addition, the user must be familiar with various manpower modeling and statistical techniques used in the model. Familiarity ensures that the user can make good choices concerning the methods used to project future sizes of various manpower groups. These techniques include linear and logistic regression, exponential smoothing, and Markov modeling. In addition, the user must be familiar with institutional aspects of reserve manpower and with research literature concerning the behavior of reservists.¹

An understanding of reservist response to changes in pay, bonuses, promotion opportunities, unemployment rates, educational opportunities, and a host of other things is important to insure that good choices are made during the course of a projection.

¹David W. Grissmer and Sheila Nataraj Kirby, *Changing Patterns of Nonprior Service Attrition in the Army National Guard and Army Reserve*, The RAND Corporation, R-3626-RA, July 1988; David W. Grissmer and Glenda Y. Nogami, *Retention Patterns for Army National Training Center*, Army Research Institute, Technical Report 781, April 1988; Burke K. Burright, David W. Grissmer, and Zahava D. Doering, *A Model of Reenlistment Decisions of Army National Guardsmen*, The RAND Corporation, R-2866-MRAL, October 1982; David W. Grissmer and Sheila Nataraj Kirby, *Attrition of Nonprior-Service Reservists in the Army National Guard and Army Reserve*, The RAND Corporation, R-3267-RA, October 1985; David W. Grissmer and John R. Hiller, *Follow-Up of Participants in the 1978 Selected Reserve Reenlistment Bonus Test*, The RAND Corporation, N-1880-MRAL, February 1983; David W. Grissmer, Zahava D. Doering, and Jane Sachar, *The Design, Administration, and Evaluation of the 1978 Selected Reserve Reenlistment Bonus Test*, The RAND Corporation, R-2865-MRAL, July 1982; Robert Shishko and Bernard Rostker, "The Economics of Multiple Job Holding," *American Economic Review*, Vol. 66, No. 3, June 1976, pp. 298-308 (adapted from Bernard Rostker and Robert Shishko, *Air Reserve Personnel Study: Volume II. The Air Reserve Forces and the Economics of Secondary Labor Market Participation*, The RAND Corporation, R-1254-PR, August 1973).

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During the testing of POSM and the review of this user's manual several people were trained to use POSM and they contributed invaluable advice and suggestions for altering the programming to make the model more useful and user-friendly. They are Colonel Frank Rush and Captain André Murphy of the Sixth Quadrennial Review of Military Compensation, Peter Rydell of RAND, and David McKenzie of Research Consultants, Inc. Peter Rydell and David McKenzie improved this user's manual by their review and comments.

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I. INTRODUCTION

This report is a user's manual for the Reserve Force Policy Screening Models (POSM).

Section II provides a general description of the model. Section III contains instructions for loading POSM onto a computer and starting the program. Section IV provides a thorough tutorial through the various menu choices in the model. The appendixes include detailed descriptions of the data, listings of all equations used in the model, and layouts for each major spreadsheet in the models.

II. MODEL DESCRIPTION

MODEL PURPOSE

The Reserve Force Policy Screening Models are a set of models designed to support decisions made in the Office of the Assistant Secretary of Defense (Reserve Affairs), the Office of the Assistant Secretary of Defense (Force Management and Personnel), and the Joint Chiefs of Staff. These offices share responsibility for manpower planning and manpower budgets of the four services and six reserve components. They review the manpower plans and budgets submitted by each of the services for internal consistency and consistency with stated OSD and service policies. They address the following types of questions.

- Have the services made realistic economic assumptions affecting future retention and accession rates?
- Are stated accession requirements consistent with end strength assumptions and retention assumptions?
- Can the components reach their end strength objectives with current resources?
- How fast can end strength be expected to grow with current accession and retention trends?
- How will pay increases or changing unemployment rates affect end strength, accession requirements, accession quality, and retention rates?

In addition, these offices are often asked to perform special analyses that usually involve tradeoffs involving manpower. Typical tradeoffs analyzed involve:

- Manpower and expenditures for readiness and modernization.
- Different experience mixes of manpower.
- Budget expenditures for recruiting and retention.
- Military technicians, full-time, and part-time personnel.
- Active and reserve personnel.
- Basic pay increases compared with increased bonus budgets.
- Size of pay raises and bonus budgets during a changing economy.
- Retirement accrual charges compared with current compensation charges.
- Accession quality and recruitment budgets.

In addition to supporting decisions at these offices, the models were specifically modified to support the Sixth Quadrennial Review of Military Compensation (QRMC). This review focused entirely on Selected Reserve compensation issues, and the reviewers were interested in models that could address specific compensation-related questions for both officers and enlisted personnel. Of special interest to the QRMC were models that dealt separately with full-time, military technician, and part-time personnel. Typical questions in the QRMC analysis included:

- Are current reserve pay levels for part-time personnel sufficient to meet projected end strengths?
- How will the manpower experience mix of the reserve components evolve in the absence of compensation changes?
- What will be the effect on accession requirements, end strengths, and the experience mix of different reserve compensation initiatives?

The models themselves are necessary, but not always sufficient to perform the consistency checks, tradeoffs, and compensation analysis listed above.

In this regard we view the models as essential building blocks in many types of analysis done by these offices. Some applications will require that the analysts construct simple or more complex additions to the models. These additions can be as simple as adding a new independent variable in continuation rate regressions, or perhaps building a more complex future economic scenario. The format of the model makes such additions easy because of the underlying LOTUS software.

SOME DESIGN CONSIDERATIONS

To develop accurate projections of inventory, models must be able to capture the quite different influences that determine individual decisions to stay or to separate from the service at different military career stages. These career stages can roughly be divided into first term, middle career, pre-retirement, and retirement eligible. Here, first term usually refers to the initial six-year obligation for nonprior-service enlistees, or to a one-year term for prior-service personnel. Middle career refers to the period 6 to 12 years after enlistment for nonprior-service personnel and 4 to 12 years of service for prior-service personnel. Pre-retirement indicates years between 12 and 20 when decisions are dominated by the presence of the retirement vesting point at 20

years of service. Retirement eligible refers to individuals with 20 or more qualifying years of service.

During the first term, attrition of individuals is quite different for different demographic groups.¹ This difference in attrition reflects decisions made by individuals under imperfect information about the reserve job, future civilian jobs, and marital prospects. Thus, an original decision to join the reserve is often reversed as individuals change jobs, marital status, or geographical location. Early attrition is also partially determined by imperfect information about recruit performance. During initial active duty training, recruits are evaluated and some are separated because of poor performance. It is not surprising that recruits with higher education have lower attrition rates than those with less education. Economic factors are also emerging as important determinants of early attrition. For instance, higher unemployment rates bring lower attrition levels.

During mid career, individual decisions to separate are governed less by demographic factors and increasingly by civilian life factors. Employer and spouse conflicts are cited by reservists as the main reasons for leaving reserve service, but military and civilian pay, civilian hours worked, unemployment, and age have also been shown to be important determinants of first- and second-term retention.² Mid-career retention equations will have different variables and coefficients than first term.

During pre-retirement, the primary and practically only influence on retention is the retirement system and its vesting provisions. Vesting is complete at 20 years of service. This induces high rates of retention for those with 12 to 20 years of service. Thus, demographic disaggregation and the need for economic factors in projection equations are unimportant at this stage.

Once retirement eligibility is achieved, separation behavior tends to be governed by the structure of pension benefits past 20 years of service, various constraints on grade attainment by years of service, and civilian pay and retirement plans. Since reserve retirement pay does not begin until age 60, and continues to increase with years of service,

¹David W. Grissmer and Sheila N. Kirby, *Changing Patterns of Nonprior Service Attrition in the Army National Guard and Army Reserve*, The RAND Corporation, R-3626-RA, July, 1988; David W. Grissmer and Sheila Nataraj Kirby, *Attrition of Nonprior-Service Reservists in the Army National Guard and Army Reserve*, The RAND Corporation, R-3267-RA, October 1985.

²Burke K. Burright, David W. Grissmer, and Zahava D. Doering, *A Model of Reenlistment Decisions of Army National Guardsmen*, The RAND Corporation, R-2866-MRAL, October 1982; David W. Grissmer, Zahava D. Doering, and Jane Sachar, *The Design, Administration, and Evaluation of the 1978 Reenlistment Bonus Test*, The RAND Corporation, R-2865-MRAL, July 1982.

there is a strong incentive for reservists to continue service until retirement pay begins. This retirement eligible group is currently increasing in size and there is concern that their longevity will raise costs without increasing readiness and will contribute to promotion stagnation for lower grade groups.

The foregoing cycle description shows that different projection techniques and variables need to be incorporated at different career stages to achieve credible projections. At some stages, simple continuation assumptions suffice; at others, behavioral equations are needed to capture retention accurately. We have accommodated these factors by allowing the user a choice of projection techniques, choices for independent variables in regressions, and the ability to develop equations specific to each disaggregated group.

Besides career stages, two other considerations dictated the model design and implementation mode. The first was the needs of the OSD staff, which is relatively small and has a broad range of responsibility. They must perform a fairly broad range of "quick reaction" studies, to monitor and check manpower and personnel plans of all components, to establish various policies governing pay, benefits, grade constraints, training and recruiting resources, and support, and to justify various categories of personnel support costs. The latter costs can depend on the experience of the force.

The models needed at OSD differ from those needed at the service level. First, OSD models need to address all reserve components. Second, OSD models need to be directed toward OSD-level decisions, which tend to be more general issues spanning the components. Third, they need to be relatively parsimonious and easy to learn and run. Without these characteristics, the models will simply not be transferable or used by OSD staff. Fourth, the OSD models should be linked and calibrated with the more extensive mainframe models maintained by the services. Then, the OSD models can serve a checking function on the more extensive service models, and can be run independently for many analyses with confidence that the results are in line with these models.

The models must also be able to simulate the effects of the major policies considered by OSD, such as pay and bonus budgets, levels of recruiting resources, and force size and growth issues. In other words, the models must be able to include behavioral supply equations containing variables corresponding to the major policy issues.

Finally, separate consideration of the different types of personnel in the reserve components is necessary. Military technicians, full-time personnel, and part-time personnel behave differently—they have different commitments and different retirement systems. Reserve

manpower models must not only be able to address these groups separately, but also must be able to combine them to derive component-wide estimates.

MODEL DESCRIPTION

The Reserve Force Policy Screening Models are a set of 48 separate models (see Table 1). There are eight separate models for each of six reserve components. For each reserve component there are four officer and four enlisted models. Three of the four models for each of the officer and enlisted components deal separately with full-time personnel, part-time personnel, or military technicians; a fourth model deals with an aggregate of all three types.³

Each model is an inventory projection model incorporating behavioral and nonbehavioral options for projecting force sizes in the future. The models incorporate the flow of personnel into and out of the force, among the different personnel groups within the force (full-time, part-time, and military technician), and into different year of service groups. It can project 14 years or more into the future based on assumptions about end strength or accession levels.

Table 1
DESCRIPTION OF 48 MODELS IN POSM

Each component: ARNG, USAR, ANG, USAFR, USNR, USMCR	{	Officer	Full time
			Part time
		Enlisted	Military technician
			All
			Full time
			Part time
			Military technician
			All

³Military technicians are full-time civilian employees of the federal government, who also must have active military membership status in the Selected Reserve (usually in the same reserve unit) as a condition of employment.

"Full-time personnel" means Active Guard/Reserve personnel who are full-time military personnel serving as members of the Selected Reserve in support of a reserve component and paid from reserve personnel appropriations on active duty pay scales and who may qualify for active duty retirement benefits.

Part-time personnel are members of the Selected Reserve who typically perform a minimum of 48 drills and 14 days of active duty each year. Their pay is determined by the reserve pay scale, which is tied to the active duty pay scale, and they may qualify for reserve retirement benefits.

Each model can develop future projections under either of two assumptions. If end strength assumptions for future years are provided, and they require accession levels that exceed the supply-constrained first-choice accessions available, the model will take retention rates and will make up the difference with demand-constrained second-choice accessions. The user can specify the characteristics of the first- and second-choice accessions. First-choice accessions are specified as those groups that are supply-constrained by current compensation and benefit levels. Second-choice accessions are demand-constrained groups. The supply of these personnel groups exceeds demand, and service policies dictate the level admitted.

Alternatively, the user can specify the number of first- and second-choice accessions in future years along with future retention rates, and the model will allow end strength to float to the level implicitly specified by these assumptions. In this mode the model predicts end strength levels resulting from specified accession and retention policies and economic assumptions.

MODEL IMPLEMENTATION

The models are implemented on an IBM AT compatible computer using LOTUS 1-2-3 software (version 2.01). The models make extensive use of the 1-2-3 macro language to make them user-friendly. The user is always presented with menu choices in making modeling decisions and choices, but also can exit the menu system to use 1-2-3 to perform supplementary analysis that can be integrated with the models. The user can then reactivate the menu system using a predefined combination of keys (e.g., the Alt key along with the "M" key). We believe that there are no other PC-based user-friendly Reserve models in use. RAND does have a model similar to the Reserve POSM, but for the Active Components, as well as a PC-based projection model⁴ (ALEC) created for Project AIR FORCE.

The model has four main modules:

- HISTORIC INVENTORY MODULE
- DECISIONS MODULE
- INVENTORY PROJECTION MODULE
- REPORTING MODULE

⁴Peter C. Rydell, *ALEC: A Model for Analyzing the Cost-Effectiveness of Air Force Enlisted Personnel Policies (Theory and Results)*, The RAND Corporation, N-2629/1-AF, August 1987.

The HISTORIC MODULE contains the historical data on nonprior- and prior-service accessions and continuation rates. The module is designed to allow the user to quickly scan and graph any time series data for any group. This allows the user to determine the size and historical trends in key manpower groups. The DECISIONS MODULE controls the choices of projection methods for accessions and continuation rates. It allows the user to move to any group, choose a projection technique, and evaluate the results of that projection technique graphically. The INVENTORY PROJECTION MODULE takes the most recent year's inventory and applies the projected accession and continuation rates to give force projections. End strength choices are made in this module. The REPORTING MODULE accepts up to two projections and allows automated graphing of comparative force profiles and year of service (YoS) groups.

HARDWARE REQUIRED

The Reserve Force POSM is designed to run on an IBM PC/AT compatible computer. Because of variations in compatibility, some minor problems may occur on non-IBM machines. The model was built on a COMPAQ Deskpro 286 machine and is completely compatible with that system.

Additional hardware needed includes two megabytes of expanded memory meeting the LOTUS/INTEL specifications; a math co-processor; a 10 megabyte hard disk; and 640 K RAM.

To summarize:

- IBM PC/AT compatible computer
- 640 K RAM
- 2 MB expanded memory meeting LOTUS/INTEL specifications
- Math co-processor
- 10 MB hard disk

COMMERCIAL SOFTWARE REQUIRED

- LOTUS 1-2-3, version 2.01 (version 3.0 may not be compatible with SQZ!)
- Turner Hall's SQZ!—a compacting software for "squeezing" LOTUS worksheet files to take less room on disk.

REQUIRED USER KNOWLEDGE

The user is assumed to have experience with personal computers and a prior working knowledge of LOTUS 1-2-3. In addition, the user must be familiar with various manpower modeling and statistical techniques used in the model. These are necessary to insure that good choices are made concerning the methods used to project various manpower groups forward. These techniques include linear and logistic regression, exponential smoothing, and the structuring of Markov models. In addition, the user must be familiar with institutional aspects of reserve manpower, and research literature concerning the behavior of reservists.

REQUIRED USER INPUT

The user is required to make several decisions before making projections of personnel. These decisions are:

- Specification of first- and second-choice accessions (DECISIONS MODULE accession branch)
- Specification of end strength (INVENTORY PROJECTION MODULE)
- Choice of "backward or forward" continuation rates (see Appendix A for data definitions) (DECISIONS MODULE)
- Projection method and equations for prior- and nonprior-service accessions (DECISIONS MODULE)
- Projection method and equations for continuation rates (DECISIONS MODULE)

End Strength and Accession Choice

End strength can be specified as either fixed or floating. In the first case the user must specify annual values of end strength for each projection year. The model will meet those end strengths by adjusting the number of second-choice accessions. Under the floating end strength option, there are no slack accession groups, and end strength is determined by the accession and retention equations in the model. In this option the user is basically determining the end strength that results from a set of deterministic accession and retention equations.

To use these options, the assumptions concerning end strength and accession choice must be coordinated within the model for any given application. Under a targeted end strength assumption the user must specify at least one accession group as second choice or else the end

strength may not be met. This second-choice group (or groups) is then automatically set annually at a level necessary to meet the targeted end strength. For an application of floating end strength, all accession groups must be specified as first choice and the data entries for targeted end strength numbers must be set artificially high to remove them as constraints. All accession levels are then determined by projection choices, and actual end strength is determined by the gains and losses projections.

When end strength is targeted, first-choice accessions should include supply-constrained groups, which the services prefer in their recruiting strategies, and second-choice groups will include the remaining groups. This preference can be between prior-service or nonprior-service personnel, and within either group can include high-quality (high educational attainment and aptitude) accession groups. This preference will differ by component and may vary over time. For instance the Navy and Air Force components have relied primarily on prior-service personnel, whereas the Army components take about equal proportions of prior- and nonprior-service personnel. Among nonprior-service personnel, the Army components prefer high school graduates with mental aptitude categories I-III.

Choice of Continuation Rates

The model contains two sets of continuation rates: a backward rate and a forward rate. The backward rate corresponds to the more traditional definition, which identifies each individual in the force at the end of a fiscal year and calculates the proportion of those individuals remaining at the end of the next fiscal year. These rates implicitly assume that the individual does not change characteristics during the year except to advance to the next year of service. Thus if we identify 100 high school graduates in YOS 2 in FY82, and through matching tapes find that 80 of those individuals are still present at the end of FY83, the continuation rate is 0.8. In making the computer tape match, the high school graduate status is taken from the first tape, and only the presence (but not the specific educational characteristic) is taken from the final tape.

Backward rates can be inaccurate for projections when individuals change characteristics during a year, when data for certain characteristics are absent, or simply when data are inaccurate. For instance, in the previous example, individuals may have moved from non-high school to high school graduate status during the year. The backward continuation rate would not accurately predict the number of people in the high school graduate cell in this instance. The forward rate is

calculated by dividing the number of persons in the FY83 high school graduate cell by the number of people in the FY82 high school graduate cell. This provides a continuation rate that corrects for certain conditions of changing characteristics. Differences between backward and forward rates also alert the analyst to potential problems with data. Appendix A contains an extended discussion of the two types of continuation rates and their usage.

Projection Options

The model has three flexible projection options for specifying future prior- and nonprior-service accession levels and continuation rates. These options are "simple ramp" techniques, linear and logistic regression, and exponential smoothing. The continuation rates may also be externally supplied.

Simple ramp techniques allow the user to specify a long-term constant value for projections with a variable number of transition years. The long-term values can be specified by simple functions of past historical values. These functions include any linear combination of historical averages and standard deviations. These functions can include only the most recent year or any set of contiguous historical years. Actual numerical values can also be used for forecasts. The number of transition years is user-specified and a simple linear interpolation between the last historical year and the long-term value is performed.

The ramp techniques are most useful for projecting future force sizes for short periods under assumptions of little change in policies or economic factors. A previous study⁵ has shown that accurate short-term projections over one to two years can be made using these simple assumptions. These techniques are also useful for performing "what if" analyses. This kind of analysis is always concerned with determining the sensitivity of projections under two assumptions. A typical question might be, "What is the sensitivity of future accession requirements to changes in first-term retention rates." Accurate sensitivity analysis can usually be done using simple projection techniques. Finally, these techniques can be used to simulate simple policy changes such as restricting reenlistment eligibility, or restricting low-quality enlistment, or changing early attrition policies.

Behavioral assumptions are required for projections over longer time frames where the effects of economic assumptions, military pay levels, and recruiting and bonus resources are important. Such effects can be

⁵David W. Grissmer, *The Accuracy of Simple Enlisted Force Forecasts*, The RAND Corporation, N-2078-MIL, June 1985.

built into the regression equations developed for accessions or continuation rates. The regression function can be linear or logistic. The latter is useful for continuation rates where values are confined between 0 and 1. Linear regression is necessary for accession levels.

The user can specify which variables to include in regressions from a user-specified table of 20 independent variables. Different regressions can be specified for each matrix row, or the user can specify a single value for any or all rows. Once a regression is done, the user can view simple regression statistics and graphs concerning parameter significance and quality of fits. Once this is done, the user can specify whether to use or reject the regression to provide projections. Projections are made using the future values of the independent variables specified in the regression table. An option exists to change these future values and automatically recalculate all projections using current regression equations. Using this option, projections using different military pay or unemployment assumptions are simple to perform.

The regression equations are fit to the annual values of historical data contained in the model. Since there are currently at most 10 years of data, regression fits to these data can provide biased elasticities. We have provided the regression option of specifying a coefficient of any number of variables and allowing the remaining variables and constant term to be determined by these historical values. In this way, the results of more accurate estimates of the effects of economic and policy variables deriving from analysis involving individual level data or experiments can be incorporated into the model.

A single exponential smoothing option is also provided which automatically calculates an "optimal" smoothing coefficient, but caution is suggested when using exponential smoothing, because few data points exist. At minimum, results should be checked against "common sense" by comparing them with some results from simple ramp projections.

LEVEL OF DISAGGREGATION

The models of part-time personnel, military technicians, and full-time officers and enlisted personnel are disaggregated by year of service only. The remaining model of all personnel types is currently disaggregated differently for officer and enlisted personnel. For enlisted personnel, the disaggregation is by sex, education (high school and non-high school), race (black and nonblack), for year of service between <1 and 12, and by year of service only after 12. For officers, the disaggregation is into occupation (medical, pilot, and other) and sex by year of

service. An automated option allows the user to assemble higher levels of aggregation before projections. For instance the enlisted force can be aggregated into only educational groups.

The model also contains the data for disaggregation by AFQT and ETS (see Appendix A for definition). The user may scan this more disaggregated data set. However, data on ETS and AFQT were often inconsistent or missing for at least three components, and disaggregation was eliminated for these characteristics.

DOCUMENTATION OF USER INPUT

For the DECISIONS, INVENTORY PROJECTION, and REPORTING MODULES it is important for the user to know what steps he took at each stage to create and report a projection. Each of these modules is set up to create a "record" of these steps.

The DECISIONS MODULE has a column, located two columns to the right of FY00 of each table (except projected accession survivors), called METHOD, which is used to record what method was used to project each row. Further, the title of the projected accession survivors table contains the word FORWARD or BACKWARD depending on which type of rates were used. When a file is *saved* in the DECISIONS MODULE, all of these tables are saved, as well as the METHOD column.

In the INVENTORY PROJECTION MODULE, the names of the accession and rates files that are used are recorded in cells B1 and F1, respectively. When a file is saved in the INVENTORY PROJECTION MODULE, all of the input tables are also saved. So, any changes the user makes to end strength, for instance, are saved with the projection.

Finally, the names of the projection files are recorded above the column containing the last year of history for each table.

So, it is possible for the user to trace back through his files to determine exactly what he did to create a projection. It is recommended, though, that the user keep a handwritten log of his files and the techniques used to create them.

FUTURE VERSIONS OF POSM

As a result of helpful evaluations by our reviewers, Peter Rydell (RAND) and David McKenzie (RCI), many improvements were made to the model immediately before this publication. Our reviewers also suggested some other improvements that would have been so time consuming to implement that they would have delayed publication, and so

we resolved to put them under consideration for a future version of POSM.

Two of the improvements we foresee include

- A method of viewing available user-created files for incorporation into the INVENTORY PROJECTION MODULE and REPORTING MODULE.
- A set of files containing default decisions on projection of accession survivors and continuation rates. These files would make it easier and safer for a less skilled user to make projections and observe the effects of changes in required end strengths, first- and second-choice accessions, and continuation rates. The authors believe that more work is needed on Reserve projections before RAND can suggest a set of default decisions.

As POSM is used, the users themselves are encouraged to suggest changes to be made for version 2. We welcome any suggestions and criticisms.

III. START UP

MODEL FILES REQUIRED

Historic Data Files:

#AGXXEFT	#AGXXOFT	#AGXXEAG	#AGXXOAG
#ARXXEFT	#ARXXOFT	#ARXXEAG	#ARXXOAG
#FGXXEFT	#FGXXOFT	#FGXXEAG	#FGXXOAG
#FRXXEFT	#FRXXOFT	#FRXXEAG	#FRXXOAG
#NRXXEFT	#NRXXOFT	#NRXXEAG	#NRXXOAG
#MRXXEFT	#MRXXOFT	#MRXXEAG	#MRXXOAG
#AGTPESH	#AGTAESH		
#ARTPESH	#ARTAESH		
#FGTPESH	#FGTAESH		
#FRTPESH	#FRTAESH		
#NRTPESH	#NRТАESH		
#MRTPESH	#MRТАESH		

Modules:

#HIS1EAG	#DECXX
#HIS2EAG	#PROXX
#HIS1OAG	#RPTXX
#HISXXFT	

Supplemental Files:

CREATE	#PREQEAG	#PREQOAG	#PREQXFT
TOPMENU	#RPEQEAG	#RPEQOAG	#RPEQXFT
SETUP	ACCCHOFT	ACCCHOPT	ACCCHOMT
SETUP.RES	ACCCHFT	ACCCHPT	ACCCHMT
A	ACCCHAG	ACCCHOAG	INDEPVAR

All of the above are "squeezed" worksheet files (unless otherwise noted). They have a .wk! extension.

LOADING THE MODEL ONTO A HARD DISK

To run the model efficiently (the only way described in this document) you must load all of the model disks onto one directory of a hard disk. Assuming that your directory is named C:\RESMODEL, change to that directory by typing C: <RETURN>, and then **cd RESMODEL** <RETURN>. Next put a disk from the model software package into the A: drive and type **copy A:*. * <RETURN>**. When the system is finished copying all of the files from that disk to the C:\RESMODEL drive, replace the disk in the A: drive with another model disk and repeat until all disks have been copied.

UPDATES

If you receive updates of any of the files in the model, you must copy the updated file over the old file. So, again do C: <RETURN> and **cd RESMODEL** <RETURN>. Then put the update disk into the A: drive and type **copy A:*. * <RETURN>**. Any update should come with instructions in a README.TXT file.

STARTING THE MODEL

During a session with the model you will save many files. If you wish to save these files in a directory other than the directory containing the model, you must create that directory below the model directory before starting LOTUS. Do C: <RETURN>, **cd RESMODEL** <RETURN>, and **mkdir USER** <RETURN> (for our example). In the model you will name this directory.

To start the model, change directories to that containing LOTUS 1-2-3 and type **SQZ** <RETURN> (SQZ! should also be in this directory). When 1-2-3 is loaded, change file directories to that containing the model files (in our case C:\RESMODEL) (do **/fd C:\RESMODEL** <RETURN>). Then retrieve the file called TOPMENU (do **/frTOPMENU** <RETURN>). This is the first menu of the model.

GENERAL RULES FOR RUNNING THE MODEL

Typing Conventions

- Menu choices within paragraphs of text will be italicized.
- The menu path to any menu choice being described is at the beginning of that section in bold type with each menu selection on a separate line.
- Key strokes are in angled brackets (e.g., <RETURN> means hit the return key).
- Two key strokes that must be done simultaneously will have a hyphen between them (e.g., <ALT>-<M>).
- Throughout the model, the user will be prompted by questions. These questions will appear in the panel area of the worksheet and are set apart and in italics within this manual.
- Menu trees for each module (there are four such trees for the HISTORIC INVENTORY MODULE) are located on a separate page near the beginning of the description of that module throughout the manual.
- File names and module names are in all capital letters.
- Whenever possible, menu choices have been spelled out and capitalized within the manual in the same manner that they are in the model. In some cases the spelling was changed in the manual for clarity.
- Within the manual, panel menus are exhibited in a box immediately after the menu sequence that leads to them.
- The appendixes include detailed descriptions of the data, listings of all equations used in the model, and layouts for each major spreadsheet in the model.

The Menu System in the Manual

Throughout the manual the path through the menu system to the menu choice being described is at the beginning of that description. The manual moves through the menu system from the top down and from the left to the right as you look at the menu trees provided for each module. Therefore, given a menu with items 1, 2, and 3 and with submenus 2a, 2b, 2c, and 2d, the submenus for 2 are described before the menu choice 3. The order of description would be:

- 1
- 2

- 2a
- 2b
- 2c
- 2d
- 3

Getting Out of Trouble

Even the most experienced user may occasionally choose the incorrect menu path or unintentionally start a lengthy calculation. There is a way of aborting the macros in progress and starting over. `<CTRL>-<BREAK>` will kill the macros and menus (it may be necessary to `<CTRL>-<BREAK>` twice) and then `<ALT>-<M>` will return you to the top of the menu system in the current module.

Using the Menu System

It is easiest to think of the menu system as an inverted tree. To move down through the tree simply choose any item from the menu by one of two methods. For menus located across the top of the screen in the panel area of the worksheet (panel menus), you may move the cursor over any choice using the arrow keys or space bar and hit `<RETURN>`, or you may type the first character of the menu choice you want.

For menus located in the working part of the worksheet (row menus, because each choice is in a different row), you must move the cursor over the choice you want and hit `<RETURN>`.

To move back up through the menu system from any level (panel menus only) use the escape key `<ESC>`. This is the only valid use of the escape key in the entire model. Use of the escape key under any other circumstance will result in unpredictable and, in many cases, incorrect results. The escape key should never be used to respond to a prompt (question). If you hit the escape key at the improper time it is best to do `<CTRL>-<BREAK>` to abort the menu system and kill any macros that are processing, and then do `<ALT>-<M>` to return to the menu system at the top in the current module.

Model Conventions

On retrieving any model worksheet you may receive a message indicating that the file has been altered in some way after you first used it.

This copy of this file is not the official RAND version. Rename it and restore the official copy from your original disks.

After you exit that worksheet you should restore the file by copying it from your original model diskettes.

Any prompt that requires a yes or no response may be answered by anything starting with <Y>, <y>, <N>, or <n>. If any other response is used (including no response), no will be assumed.

In every module, *Work Alone* will release the user from the menu system and allow him to take full advantage of all of 1-2-3's functions. The user may wish to do calculations in a "blackboard" area. No area is reserved for the blackboard, so, to insure that none of the macros or data are overwritten by the blackboard, it is best to do <END><HOME> to get to the bottom left-hand corner of the used worksheet area and proceed from there.

The "indicator" is in the upper right corner of the screen. It will always guide you in the sort of response that is required. Below are some examples of indicators you will see.

- **WAIT** - means wait, macro operations are being performed.
- **RETRN** - means hit <RETURN> when ready to continue.
- **POINT** - means use the cursor to point at data to use, and then hit <RETURN>.
- **ANSW** - means answer the question that appears in the panel.
- **ALT-M** - means do <ALT>-<M> to return to the menu system.

Throughout the manual you will see an example that is worked through to help you understand the workings of the model. In that example, the intent is to demonstrate the accessions required for the Army National Guard enlisted part-timer force to meet a growth in strength of 2 percent per year for the next five years under two youth unemployment scenarios: (1) unemployment stable at the 1987 level, and (2) unemployment increasing steadily for five years to the highest yearly level of the good historic years (see Appendix A for data definitions), and then remaining stable at that level through fiscal year 2000 (FY00). The example is not intended to be entirely realistic or a "good" projection. It is intended only to demonstrate the mechanics of making a comparison of this kind. It may be considered a tutorial.

IV. THE MENU SYSTEM

TOPMENU

Upon retrieving the file TOPMENU you will be presented with a menu of choices for the various modules as well as a "Setup" choice (see Figs. 1 and 2). The first time you run the model you will probably want to "Setup" the various model parameters, but after that you will rarely if ever change them.

Setup

Choosing *Setup* brings up a small worksheet (see Fig. 3) by the same name with a menu of model parameters that may be changed.

To change the settings within *Setup* move the cursor over the name of the parameter you wish to change and hit <RETURN>. When you have changed all of the parameters that you wish to change move the cursor over *Quit* and hit <RETURN>.

If you move the cursor over an invalid cell you will get the following message:

INVALID CHOICE. Hit <RETURN> and choose again.

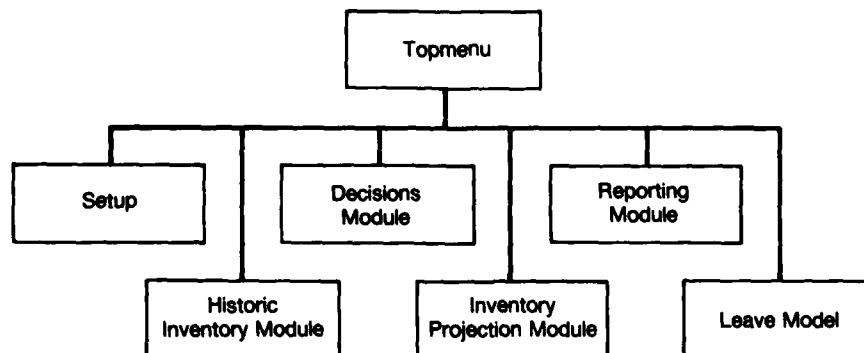


Fig. 1—TOPMENU menu system

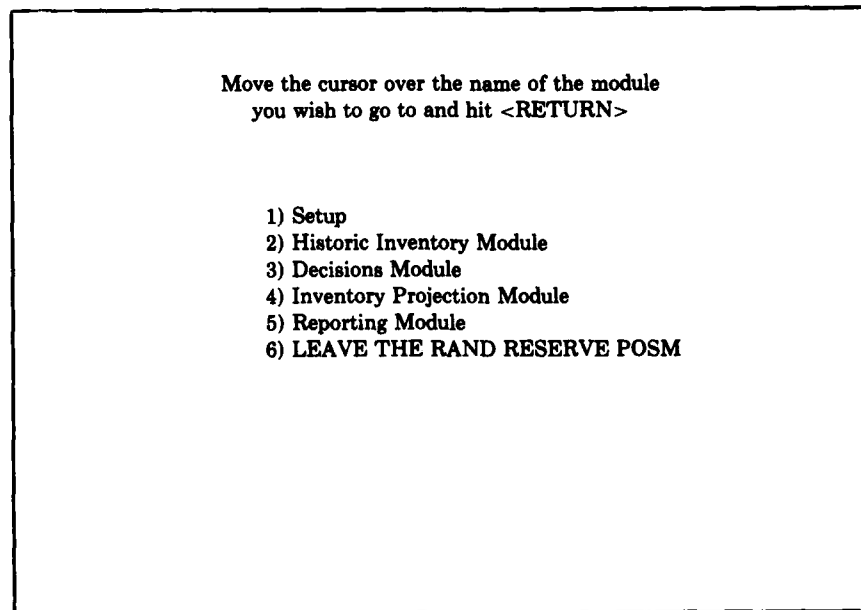


Fig. 2—First screen (the row menu) of the modules
menu (TOPMENU)

Hit <RETURN> to reposition the cursor and continue.

Setup Windows and Panels

This menu choice allows you to set whether or not the windows and panels will be frozen during calculations. This will significantly speed up the model operation.

Setup Clock and Calendar

This option allows you to set the clock and calendar indicators on the lower left corner of the screen to on or off. If you use the model with a monochrome monitor you may wish to turn these off so they don't burn into the screen.

SETUP MENU		
Place the cursor in column B on the row of the item you wish to change and hit <return>. This will change the switch from "ON" to "OFF" or vice versa.		
To leave this menu place the cursor on "Quit" and hit <return>.		
	ON	OFF
Windows and Panels		*
Clock and Calendar		*
1-2-3 Help	*	
Graph grids		*
Manual Y-scale		*
Graph color		*
Quit		

Fig. 3—Row menu for SETUP

Setup**1-2-3 Help**

This option turns on and off the 1-2-3 help system and will only help floppy system users.

Setup**Graph Grids**

This option will allow you to determine if all graphs have horizontal and vertical grid lines.

Setup
Manual Y-scale

The y-scale on all graphs may be set manually by the user or automatically by 1-2-3. If this option is "on" the y-scale will be set manually by the macro system using 0 as the lower limit and the maximum of the data for the upper limit.

Setup
Graph Color

This option will allow the user to see color graphs on a color monitor.

Setup
Quit

Upon choosing *Quit* you will be prompted for a directory name for your saved files.

Name the directory you wish to save files in (<RETURN> if not):

That directory must be below the model's directory. Enter a directory name (one that exists or one you create) or just hit <RETURN>.

Next, a text file is set up which is used by all modules to determine whether each parameter is set "on" or "off," and then you are returned to the module menu (TOPMENU).

Example

To set up the default LOTUS "characteristics" choose 1) *Setup* (see Fig. 2, above). To adjust the model setup to that in Fig. 3, use <↓> or <↑> to place the cursor next to the choice to be changed and hit <RETURN>. To finish, place the cursor next to *Quit*, hit <RETURN>, supply a subdirectory name (USER for our example), and hit <RETURN> again.

HISTORIC INVENTORY MODULE

The HISTORIC INVENTORY MODULE (see Fig. 4) is a series of worksheets containing the historical data used within the model. Here you can look at tables and graphs of the data in various levels of detail.

Historic Inventory Module

Return to Previous Menu

As in all cases *Return to previous menu* does just that.

Historic Inventory Module

YoS breakouts—Aggregated—Enlisted

HISTORIC INVENTORY MODULE - Type

Move the cursor over the name of the component
you wish to go to and hit <RETURN>

- 1) Return to Previous Menu
- 2) YoS breakouts - Aggregated - Enlisted
- 3) YoS breakouts - Aggregated - Officer
- 4) YoS breakouts - Disaggregated - Enlisted
- 5) YoS only - Full-time/Part-time/Military Tech.

Fig. 4—Row menu for the first menu of the HISTORIC INVENTORY MODULE

1) ARNG 2) USAR 3) ANG 4) USAFR 5) USNR 6) USMCR

This section of the HISTORIC INVENTORY MODULE (see Figs. 5 and 6) presents tables in the selected aggregation. That aggregation

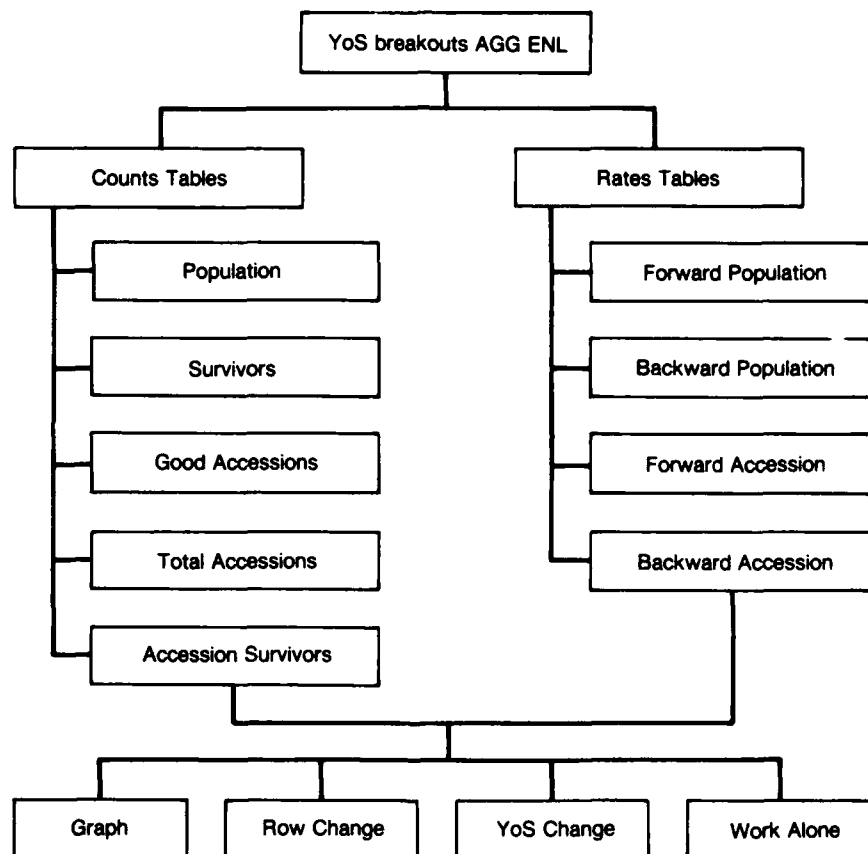


Fig. 5—Menu system for the HISTORIC INVENTORY MODULE YoS breakouts—Aggregated—Enlisted

is by sex, race, and education included in YoS <1-12 and YoS only in YoS 13-30+ and unknown.

To begin, choose a component from the panel menu. After it is loaded, choose the table you wish to view.

Counts Tables	Rates Tables	Quit
---------------	--------------	------

Historic Inventory Module
YoS breakouts—Aggregated—Enlisted
Counts Tables

Population	Survivors	Good Access.	Total Access.	Access. Survivors
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For data descriptions see Appendix A.

Historic Inventory Module
YoS breakouts—Aggregated—Enlisted
Rates Tables

1)Forward Popul.	2)Backward Popul.	3)Forward Access.	4)Backward Access.
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For data descriptions see Appendix A.

The cursor will be located on the number in the FY78 column and first YoS <1 row in the table you have chosen.

Historic Inventory Module
YoS breakouts—Aggregated—Enlisted
Rates Tables or Counts Tables
Quit

Choosing *Quit* will return you to the module menu (TOPMENU).

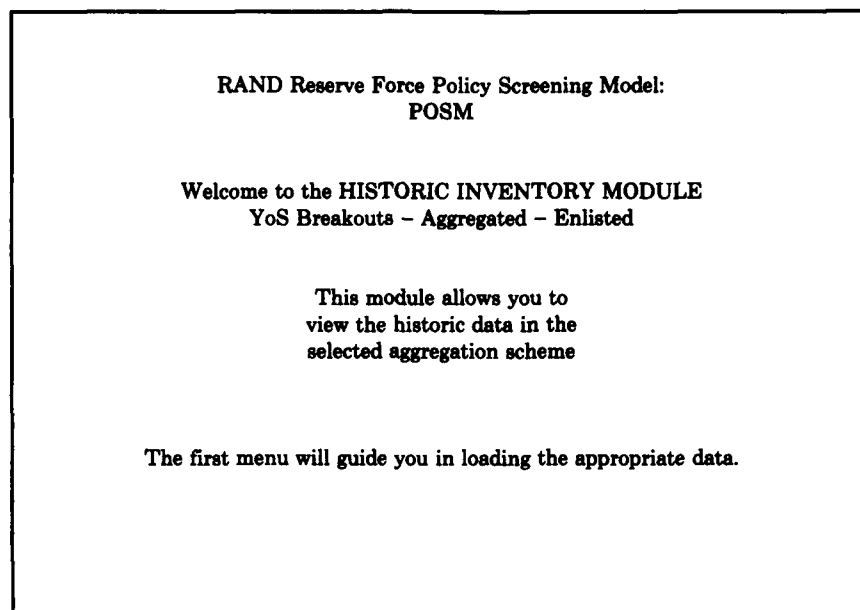


Fig. 6—Opening screen of the HISTORIC INVENTORY
MODULE YoS breakouts—Aggregated—Enlisted

Graph	Row Change	YoS Change	Work Alone
-------	------------	------------	------------

Historic Inventory Module
YoS breakouts—Aggregated—Enlisted
Rates Tables or Counts Tables
Graph

Graph will graph the row on which the cursor currently sits. After viewing the graph, hit any key to return to the menu system.

Historic Inventory Module
YoS breakouts—Aggregated—Enlisted
Rates Tables or Counts Tables
Row Change

Row Change will allow you to browse through the table and pick a row to graph or simply to view. After choosing *Row Change*, move the cursor to the row you wish to graph or view and hit <RETURN>. Then to graph that row choose *Graph*.

Historic Inventory Module
YoS breakouts—Aggregated—Enlisted
Rates Tables or Counts Tables
YoS Change

When working with the disaggregated or aggregated data sets, you will find it useful to use *YoS Change* rather than *Row Change*, because the row you want may be in YoS 30 and 150 rows down, but this option will work for any RAND data set. You will be prompted for the YoS you want:

Enter YoS desired (<1,1,...,30,30+,UNK,TOTAL).

Enter the proper YoS as the prompt indicates and hit <RETURN>. The first row of that YoS will appear with the cursor on it and the menu will reappear.

An invalid response will bring up the prompt

INVALID CHOICE!
Hit <RETURN> and try again.

Hit <RETURN> and make an entry according to the prompt.

Historic Inventory Module
YoS breakouts—Aggregated—Enlisted
Rates Tables or Counts Tables
Work Alone

Work Alone releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

Example

You wish to view the table of Army National Guard Enlisted Accession Survivors. When the worksheet comes up you make the following menu choices:

- 1) 1)ARNG
- 2) Counts Tables
- 3) Access. Survivors

and you see the table in Fig. 7. You now wish to see a graph of YoS 5 black females with a high school education. Make the following menu choices

- 4) YOS change
- 5) <5><RETURN> in response to "YoS" prompt

Army National Guard - Accession Survivors													
R	E												
S	A	D	Y										
E	C	U	O										
X	E	C	S	FY78	FY79	FY80	FY81	FY82	FY83	FY84	FY85	FY86	FY87

F	B	N	<1	0	86	371	407	455	132	158	131	207	207
F	B	H	<1	0	833	838	1014	1250	747	799	611	567	567
F	W	N	<1	0	213	1022	1145	1000	414	361	418	682	682
F	W	H	<1	0	1469	1808	2033	2373	1618	1302	1361	1547	1547
M	B	N	<1	0	3953	4671	4428	3562	2687	3948	2448	2622	2622
M	B	H	<1	0	2616	3336	3630	4176	3827	4592	3416	4179	4179
M	W	N	<1	0	13074	19555	19884	16750	15485	17287	14460	16048	16048
M	W	H	<1	0	9078	14555	14331	15782	16568	15315	15014	16696	16696
F	B	N	1	0	0	1	11	13	8	1	2	1	1
F	B	H	1	0	34	64	61	54	83	49	43	39	39
F	W	N	1	0	2	7	21	30	18	8	1	3	3
F	W	H	1	0	121	191	138	184	160	104	119	92	92
M	B	N	1	0	75	143	120	88	53	30	48	24	24

**Fig. 7—Accession Survivors in the HISTORIC INVENTORY
MODULE—YoS breakouts—Aggregated—Enlisted**

- 6) Row change
- 7) <↓><RETURN> to position cursor
- 8) Graph

and you see the graph in Fig. 8.

- 9) <RETURN> or any other key to leave the graph

To leave this module do

- 10) <ESC> <ESC>
- 11) <QUIT>

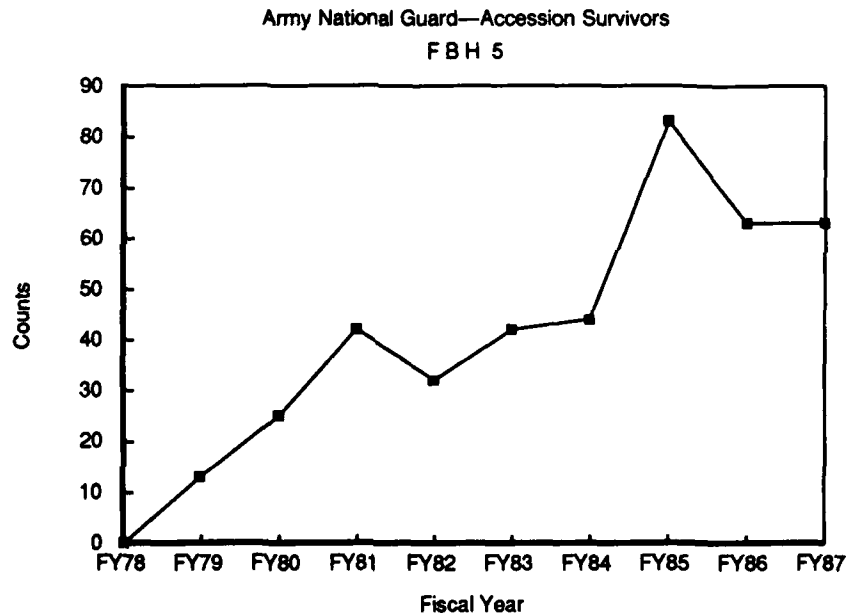


Fig. 8—Graph of row in HISTORIC INVENTORY MODULE—
Aggregated—Enlisted

Historic Inventory Module
YoS breakouts—Aggregated—Officer

This group is the same as YoS Breakouts—Aggregated—Enlisted except that it includes officers only, and the aggregation scheme is sex in YoS <1-15, and DOD occupation code in YoS <1-30+ and unknown.

For data descriptions see Appendix A.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted

Choose Table	Make Table	View Table	Save	Work Alone	Quit
--------------	------------	------------	------	------------	------

In this module (see Figs. 9 and 10) the user can define in detail a new table formed by aggregating any combination of characteristics. For instance, the user may wish to view a table consisting of females. This will be done by aggregating across all female subgroups in the set of basic tables. The user defines the table in the *Choose Table* menu and then the macro system creates that table. Although the user could perform this aggregation using LOTUS commands and the *Work Alone* option, this process is automated to guard against errors.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Choose Table

A choice must be made for each of several categories. These choices will be the same for every YoS in the table.

When the screen shown in Fig. 11 appears, the cursor will be located in the response column (column AM) in the COMPONENT row. To make a choice in each row type in the first character for that choice, use the <↑> or <↓> key to move to the next row you wish to change, and continue. Do not hit <RETURN> until you have finished defining the table. Once finished, hit <RETURN> and the main menu will reappear.

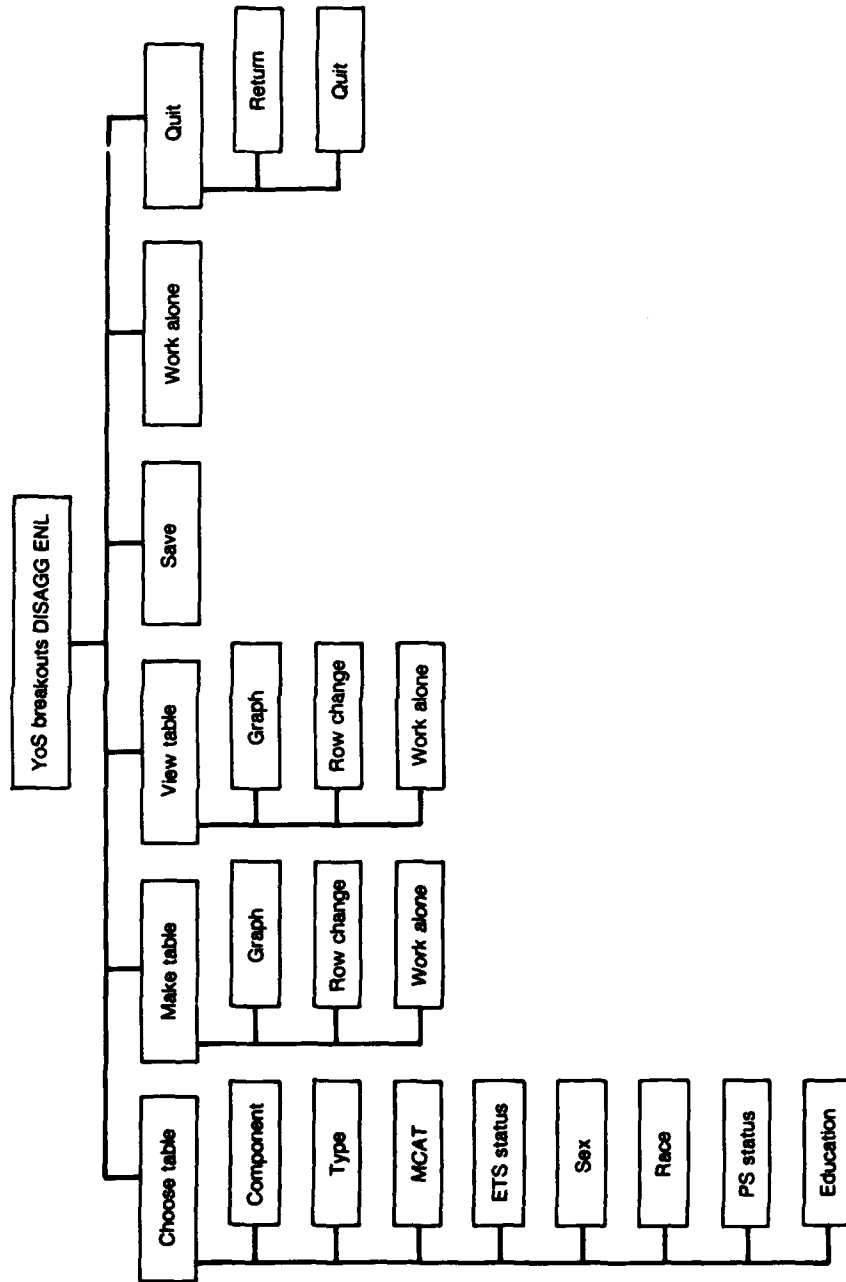


Fig. 9—Menu system for the HISTORIC INVENTORY MODULE—YoS breakouts—Disaggregated—Enlisted

RAND Reserve Force Policy Screening Model:
POSM

Welcome to the HISTORIC INVENTORY MODULE
YoS Breakouts—Disaggregated—Enlisted

This module allows the user
to view tables of his own definition.

Fig. 10—Opening menu of the HISTORIC INVENTORY
MODULE—YoS breakouts—Disaggregated—Enlisted

CHOOSE THE TABLE YOU WISH TO VIEW

To choose the table you wish to view type in the first letter or
number of your choice for each category WITHOUT HITTING <RETURN>.
When finished hit <RETURN>.

COMPONENT (1.ARNG, 2.USAR, 3.ANG, 4.USAFR, 5.USNR, 6.USMCR)	1
TYPE (Population Inventory, Total Accessions)	P
MCAT (I-III, Other, Total)	I
ETS STATUS (ETS, Non-ETS, Total)	E
SEX (Female, Male, Total)	F
RACE (Black, Non-black, Total)	B
PS STATUS (Prior Service, Non-prior Service, Unknown, Total)	P
EDUCATION (High School, Non-high School, Total)	N

Fig. 11—Row menu for *Choose Table* in the HISTORIC
INVENTORY MODULE

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Make Table

Make Table takes the table you have defined under *Choose Table* and creates it from the disaggregated data base. This table will have one row for every YoS.

If any choice made under *Choose Table* is invalid, you will be warned here before the table is made. The message

INVALID CHOICE

Hit <RETURN> -- change entry -- hit <RETURN> again.

will appear. Follow the instructions in the second line of the message to change the entry and continue. When all invalid choices have been replaced with valid choices, the macro will proceed to produce the table.

When the table is complete you will view it on the screen.

Graph	Row Change	Work Alone
-------	------------	------------

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Make Table
Graph

Graph will graph the row on which the cursor currently sits. After viewing the graph hit any key to return to the menu system.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Make Table
Row Change

Row Change will allow you to browse through the table and pick a row to graph or simply to view. After choosing *Row Change*, move the cursor to the row you wish to graph or view and hit <RETURN>. Then to graph that row choose *Graph*.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Make Table
Work Alone

Work Alone releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
View Table

View Table will always bring onto the screen the table that was most recently created. The menu that comes up with the table is the same as the menu appearing immediately after making a new table with *Make Table*.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Save

Save will allow you to save the table that you made with this module. The panel will prompt you for the file name:

Enter save file name: "directory name"

Enter a file name, including the extension if that extension is not .wk!, and hit <RETURN>. If a file by that name has already been saved you will be prompted:

Cancel	Replace
--------	---------

Choose *Replace* to overwrite the old file with the new, or *Cancel* to abort the save. If you choose to *Cancel* you will get the *Enter save file name* prompt again.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Work Alone

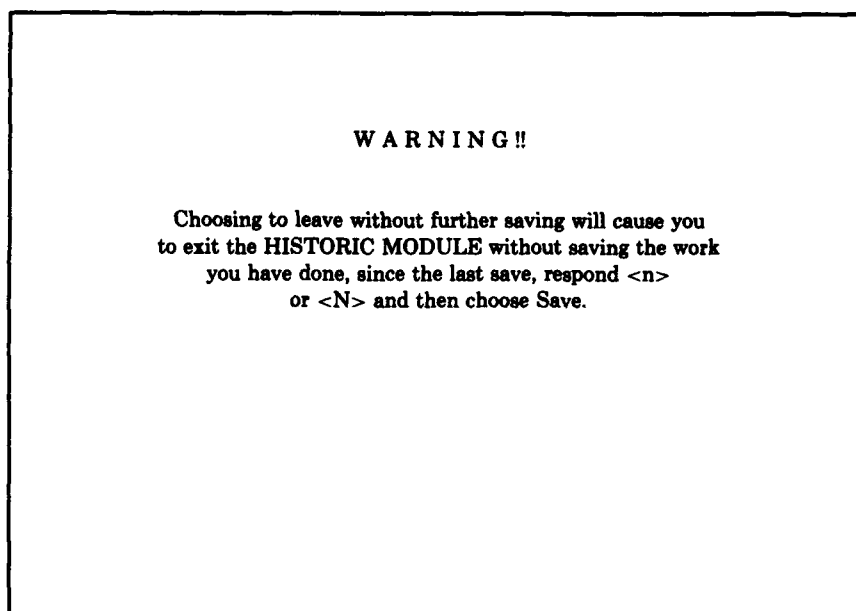
As always, *Work Alone* releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

Historic Inventory Module
YoS breakouts—Disaggregated—Enlisted
Quit

To quit you must go through a confirmation prompt. This allows you the option of not quitting if you have neglected to save a table (see Fig. 12).

Do you wish to leave without further saving (y or n)?

Answer <Y> or <y> to exit, or <N> or <n> to return to the menu and *Save*.



**Fig. 12—Exit message for the HISTORIC INVENTORY
MODULE—YoS breakouts—Disaggregated—Enlisted**

Example

You wish to view a table of Army National Guard reservists with mental category I-IIIa. When the worksheet comes up do

- 1) Choose Table
- 2) <1> <↓>
- 3) <P> <↓>
- 4) <I> <↓>
- 5) <T> <↓>
- 6) <T> <↓>
- 7) <T> <↓>
- 8) <T> <↓>
- 9) <T> <↓>
- 10) <RETURN>
- 11) Make Table

After some time you will view the table in Fig. 13. To graph YoS 30 do

- 12) Row Change
- 13) <↓> to YoS 30
- 14) <RETURN>
- 15) Graph

and you will see the graph in Fig. 14. To save that table for future use do

- 16) <RETURN>
- 17) <ESC>
- 18) Save
- 19) Give a valid, new file name, <RETURN>

and then to leave the worksheet do

- 20) Quit
- 21) Answer <Y> to prompt, <RETURN>

Historic Inventory Module**YoS only—Full-time/Part-time/Military Tech.**

This part of the HISTORIC INVENTORY MODULE (see Figs. 15 and 16) presents a template worksheet onto which the full-time, part-time, and military technician data for one component (your choice) and officer or enlisted (your choice) will be superimposed. All tables are FY by YoS only, and no aggregation is automated.

ARNG - Population Inventory											
M R E											
C E S A D Y											
A T E C P U O											
T S X E S C S	FY78	FY79	FY80	FY81	FY82	FY83	FY84	FY85	FY86	FY87	

I											
<1	23483	32728	39519	38396	38149	35887	40727	33027	35069	36370	
1	26721	24583	31102	36625	34891	34865	32261	33954	28822	30436	
2	22319	22320	20837	26383	30565	28782	29745	25539	27594	23164	
3	16292	19855	20495	18402	23301	26898	25389	24442	21372	22063	
4	13384	15171	18596	18694	16555	21412	25509	21544	21795	18636	
5	12789	12005	14416	17046	17258	15238	20322	21765	19715	19242	
6	27279	17623	18481	21133	23012	21850	19498	20877	20788	16697	
7	23879	19631	14414	15697	17749	19679	18559	15545	17904	16571	
8	21842	18728	16354	12952	14106	15642	17343	15106	14127	15407	
9	14956	17857	15944	14425	11828	12661	14160	14120	13982	12275	
10	11573	12818	15409	14300	13087	10710	11512	11716	13128	12202	
11	8742	10248	11633	14092	13133	11997	9804	9524	10974	11661	

Fig. 13—Table created in the HISTORIC INVENTORY
MODULE—YoS breakouts— Disaggregated—Enlisted

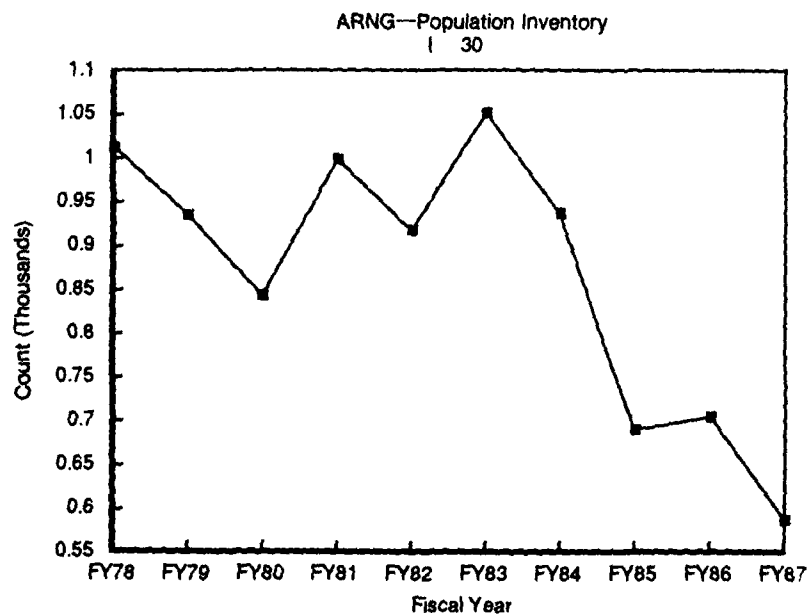


Fig. 14—Graph of MCAT I-III reservists with YoS 30 in the
HISTORIC INVENTORY MODULE

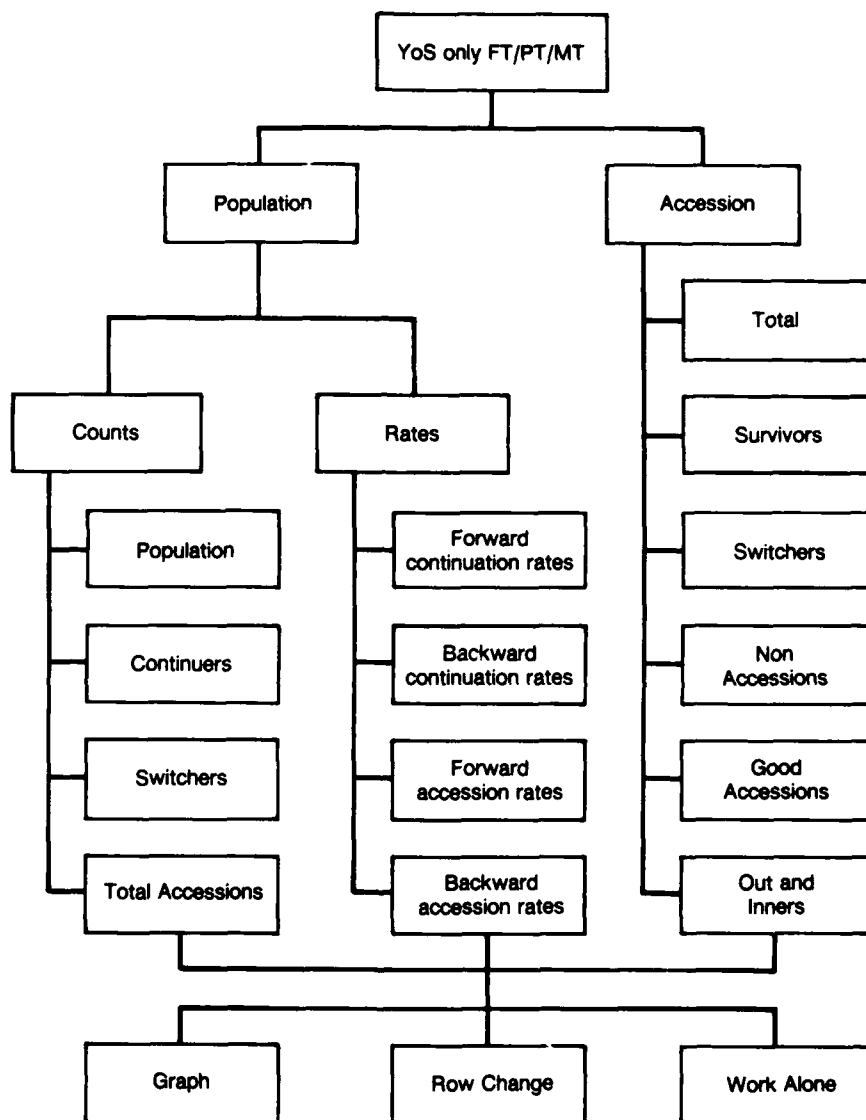


Fig. 15—Menu system for the HISTORIC INVENTORY MODULE—YoS only—Full-time/Part-time/Military Tech.

The first screen (see Fig. 16) of the template presents a brief, descriptive message and presents two menus to simplify the component and category (officer/enlisted) choices.

1) ARNG	2) USAR	3) ANG	4) USAFR	5) USNR	6) USMCR
---------	---------	--------	----------	---------	----------

Enlisted	Officer
----------	---------

Once these choices are made, the appropriate data are loaded.

Full-time	Part-time	Military Tech.	New Data	Work Alone	Quit
-----------	-----------	----------------	----------	------------	------

Full-time, part-time, and military technician data are all included on the same worksheet. You may move among them at random through the menu.

Historic Inventory Module

YoS only—Full-time/Part-time/Military Tech.

New data

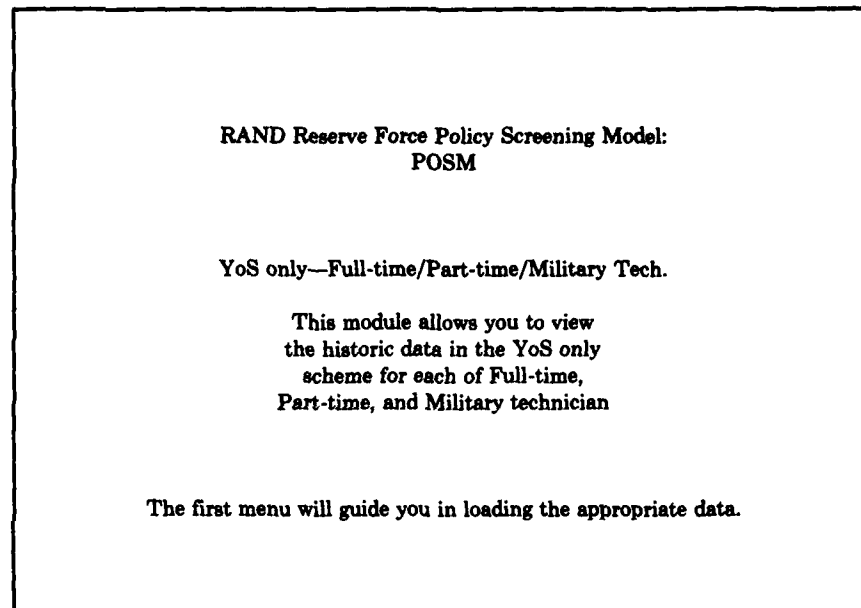
This choice will allow you to choose a new data set to view (a different component or category). The existing data will not be erased until you have chosen the new data set, so you may <ESC> out of this if you choose not to load new data. Do <ALT>-<M> to recover the menu system.

Historic Inventory Module

YoS only—Full-time/Part-time/Military Tech.

Work Alone

Work Alone releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.



**Fig. 16—Opening screen of HISTORIC INVENTORY MODULE—
YoS only—Full-time/Part-time/Military Tech.**

Historic Inventory Module
YoS only—Full-time/Part-time/Military Tech.
Quit

Quit will allow you to exit this module and return to TOPMENU. You will be prompted about saving a file to insure that you have done so if you intend.

Do you wish to leave without further saving (y or n)?

Answer <Y> or <y> to exit, or <N> or <n> to return to the menu and *Save*.

The next series of menus allows you to move among the many different types of tables. They are:

Accessions	Population
------------	------------

Accessions:

1)Total	2)Survivors	3)Switchers	4)Non-Access.	5)Good Access.	6)Out/In
---------	-------------	-------------	---------------	----------------	----------

Population:

Counts	Rates
--------	-------

Population Counts:

Population	Continuers	Switchers	Total Accessions
------------	------------	-----------	------------------

Population Rates:

1)Forward Popul.	2)Backward Popul.	3)Forward Access.	4)Backward Access.
------------------	-------------------	-------------------	--------------------

For data descriptions see Appendix A.

Once you are viewing the table you wish, you may browse the table through the main menu.

Graph	Row Change	Work Alone
-------	------------	------------

Historic Inventory Module

YoS only—Full-time/Part-time/Military Tech.

Full-time, Part-time, or Military Tech.

some table

Graph

Graph will graph the row on which the cursor currently sits. After viewing the graph hit any key to return to the menu system.

Historic Inventory Module**YoS only—Full-time/Part-time/Military Tech.****Full-time, Part-time, or Military Tech.****some table****Row Change**

Row Change will allow you to browse through the table and pick a row to graph or simply to view. After choosing *Row Change* move the cursor to the row you wish to graph or view and hit <RETURN>. Then to graph that row choose *Graph*.

Historic Inventory Module**YoS only—Full-time/Part-time/Military Tech.****Full-time, Part-time, or Military Tech.****some table****Work Alone**

Work Alone releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

Example

You wish to view a table of enlisted Army National Guard full-time nonaccessors. When the worksheet comes up choose

- 1) 1)ARNG
- 2) Enlisted

Wait for data to load,

- 3) Full-time
- 4) Accession
- 5) 4)Non-Access.

and you will see the table in Fig. 17. To leave the worksheet do

- 6) <ESC> <ESC> <ESC>
- 7) Quit

DECISIONS MODULE

The DECISIONS MODULE (see Figs. 18 and 19) is a worksheet template of macros onto which historic data are put so that the user may make decisions about the following:

SELECTED RESERVE FULL-TIMERS ARMY NATIONAL GUARD ENLISTED NO ACCESSOR COUNTS YEARS OF SERVICE BY FILE YEAR									
YOS	FY79	FY80	FY81	FY82	FY83	FY84	FY85	FY86	FY87
< 1	0	0	0	0	0	1	0	0	1
1	0	0	0	0	1	2	0	3	2
2	0	0	1	0	0	2	1	2	1
3	0	0	0	0	3	3	2	6	3
4	0	0	2	0	1	5	6	9	2
5	0	0	3	0	0	4	12	4	7
6	0	0	1	2	1	4	16	5	1
7	0	0	0	0	2	8	10	3	2
8	0	0	2	1	0	3	6	3	2
9	0	0	2	0	0	4	6	4	5
10	0	0	1	1	2	2	7	3	2
11	0	0	3	1	0	2	1	3	4
12	0	0	1	0	1	3	4	3	3

Fig. 17—Table of Nonaccessors in the HISTORIC INVENTORY MODULE—Full-time/Part-time/Military Tech.

- How to forecast adjusted total accessions.
- How to forecast accession survival rates.
- Which rows of accession survivors should be first choice (supply-limited) or second choice (demand-limited).
- How to forecast continuation rates.

These decisions are really the drivers for the projection of the population inventory that is performed in the PROJECTION MODULE.

The PROJECTION MODULE requires that all of these decisions be made before entry. Two main steps are involved: making decisions on accessions, and making decisions on population continuation rates.

To begin, define the group you wish to work on:

1) ARNG	2) USAR	3) ANG	4) USAFR	5) USNR	6) USMCR
---------	---------	--------	----------	---------	----------

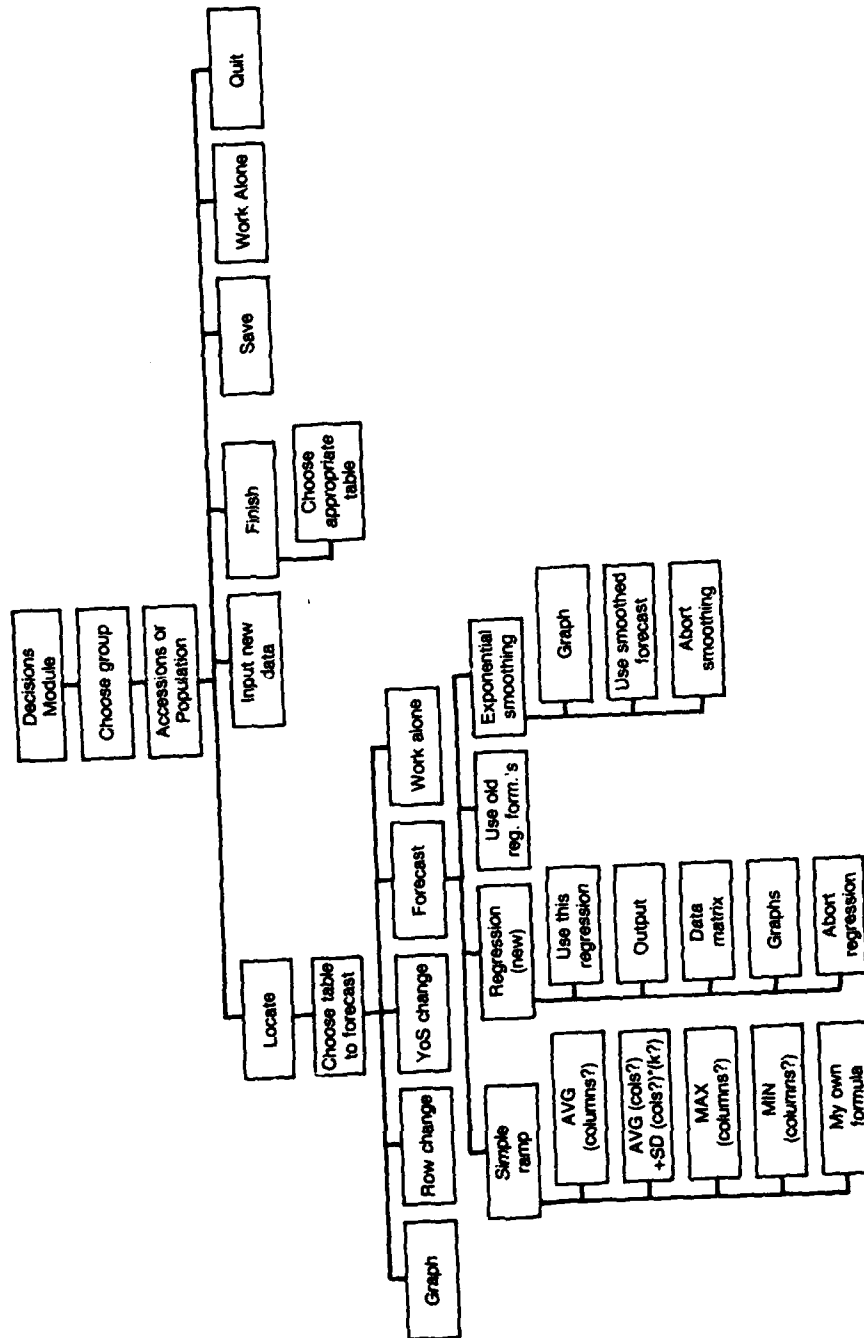


Fig. 18—Menu system for DECISIONS MODULE

**RAND Reserve Components Policy Screening Model:
POSM**

Welcome to the DECISIONS MODULE

This module will aid you in making decisions about the
forecast of accessions and population continuation
rates in preparation for making population projections.

Start by choosing the component you wish to work with.

Fig. 19—Opening screen of the DECISIONS MODULE

Full-time	Part-time	Military Tech.	New Data	Work Alone	Quit
-----------	-----------	----------------	----------	------------	------

Enlisted	Officer
----------	---------

Accessions	Population
------------	------------

All of the tables for making decisions will be loaded, and the menu below will appear.

Locate	Input New Data	Finish	Save	Work Alone	Quit
--------	----------------	--------	------	------------	------

Decisions Module
Accessions
Locate

Define the particular accession table you wish to work on:

Total Counts	Backward Surv. Rates	Forward Surv. Rates	Projected Access.
--------------	----------------------	---------------------	-------------------

OR

Decisions Module
Population
Locate

Define the particular continuation rate table you wish to work on:

Backward Continuation Rates	Forward Continuation Rates
-----------------------------	----------------------------

Graph	Row Change	YoS Change	Forecast	Work Alone
-------	------------	------------	----------	------------

Decisions Module
Accessions or Population
Locate
some table
Graph

Graph will graph the row on which the cursor currently sits. After viewing the graph, hit any key to return to the menu system.

Decisions Module
Accessions or Population
Locate
some table
Row Change

Row Change will allow you to browse through the table and pick a row to graph or simply to view. After choosing *Row Change* move the cursor to the row you wish to graph or view and hit <RETURN>. Then to graph that row choose *Graph*.

Decisions Module
Accessions or Population
Locate
some table
YoS Change

When working with the disaggregated data sets, you will find it useful to use *YoS Change* rather than *Row Change* as the row you want may be in YoS 30 and 150 rows down, but this option will work for any RAND data set. You will be prompted for the YoS you want:

Enter YoS desired (<1,1,...,40,40+,UNK,TOTAL).

Enter the proper YoS as the prompt indicates, and hit <RETURN>. The first row of that YoS will appear with the cursor on it and the menu will reappear.

An invalid response will bring up the prompt

INVALID CHOICE!
Hit <RETURN> and try again.

Hit <RETURN> and make an entry according to the prompt.

Decisions Module
Accessions or Population
Locate
some table
Forecast

Simple Ramp	Regression (new)	Use old reg. form's	Exponential Smoothing
-------------	------------------	---------------------	-----------------------

Before choosing *Forecast*, be sure the cursor is on the row you wish to forecast. If you have made this choice and you are not on the correct row you will need to <ESC> back up to the menu with *Row Change* or *YoS Change* on it and move the cursor, and then choose *Forecast* again. Since choosing *Forecast* initiates the combining of a large macro file, which takes time to load, it is always best to get the cursor where you want it first.

The model provides you with a default set of forecasts done by the "most recent year" method. In many cases, this may be the forecast

you wish to use. However, in some of the data sets the most recent year will not contain a value in some rows. For instance, when a continuation rate is generated, the denominator of the formula may be zero. In that case what you will see in that cell is something like "0/0". This indicates what the numerator and denominator really are so that you can better decide what to replace it with (there are cases where the numerator is non-zero and the denominator is zero: See Appendix A). All such cases must be resolved before going on to the PROJECTION MODULE, so you should at least look briefly at the default forecasts.

It is through this menu choice that you will begin to make decisions. As indicated by the resultant menu, there are three basic ways to forecast the accessions and continuation rates. You may decide to use any of these choices for each row of the forecast.

Decisions Module

Accessions or Population

Locate

some table

Forecast

Simple ramp

A simple ramp is made by choosing a formula that will produce a flat long-term forecast with a short-term ramp from the final data point to the long-term value.

Following the directions on the screen (see Fig. 20), move the cursor over the formula of your choice.

If you hit <RETURN> while the cursor is not located over a formula you will bring up the prompt

WRONG CHOICE

Hit <RETURN> to continue.

Hit <RETURN>, reposition the cursor to a valid cell, and hit <RETURN> again.

After a valid choice is made the cursor will return to the row you were in on the first year of the forecast and part of the formula will appear in the edit panel (if *My own formula* is chosen you will enter the edit mode so that you can enter the formula). Wherever there is a question mark in the formulas, an address or constant must be supplied. So, for instance, if you chose *AVG(columns?)* you will see

+avg(_

Formula Selection

AVG(columns?)
 AVG(cols?) + SD(cols?)*(k?), $-3 < k < 3$
 MAX(columns?)
 MIN(columns?)
 My Own Formula

Highlight your choice and hit RETURN.

**Fig. 20—Row menu of formula choices in the DECISIONS
MODULE—Forecast, Simple Ramp**

in the second row of the panel (where the _ will be the flashing cursor). Refer to your Lotus 1-2-3 manual for instructions on editing. Using the arrow keys you will then move the cursor to the first number you wish to use in the average, then if you want to indicate a range you will anchor the cursor using the period <.> key and move the cursor to the last cell you wish to include in the range. If you wish to specify nonadjacent cells, point to each cell and then hit the comma <,> key in between. Once you are done specifying the cells to be included in the average hit <RETURN> and, in this case, the rest of the formula will appear. You may edit it at this point in case you have made an error. Once you are done editing the formula, hit <RETURN> again and you will be prompted for the number of years to use in the ramp. This simply specifies the period of adjustment to the long term value.

Enter # FY's for interim-period, ≥ 0 :

Enter a number greater than zero and hit <RETURN>. A negative response (e.g., -1) or a response that is too large will bring up the prompt

WRONG CHOICE

Hit <RETURN> to continue.

Hit <RETURN> and enter a valid response. You may then indicate that you wish to use this formula on a number of adjacent rows below the one that your cursor is on.

How many MORE rows down from here use the formula? (999 = ALL):

Enter the number of rows on which you wish to apply the same forecasting technique (0 if only the row the cursor is on or 999 to go to the end of the matrix) and hit <RETURN>. A negative response (e.g., -1) will bring up the prompt

WRONG CHOICE

Hit <RETURN> to continue.

Hit <RETURN> and enter a valid response. The program will calculate the ramps, fill in the numbers, and put the formulas in the column marked METHOD. The screen will display this column as well as the last three years of forecast. Following the prompt in the second row of the panel, hit <RETURN> to get back to the menu and continue. You may find it helpful to graph the row(s) that you have forecast. These graphs contain the historical data as well as the forecast values.

You may change your mind about the method or formula you used on any given row at any time by simply locating the cursor on the row you wish to change through use of the *Row Change* or *YoS Change* menu choices and then choosing *Forecast* again.

Decisions Module**Accessions or Population****Locate****some table****Forecast****Regression (new)**

Use this regression	Output	Data matrix	Graphs	Abort regression
---------------------	--------	-------------	--------	------------------

The regression will use a matrix of independent variables and the matrix of historical counts or rates to forecast the future. This choice is designated as "new" because it assumes that you have not done or do not wish to use a previous regression on this row. The first prompt to appear in the second line of the panel is:

Do you want to use LOGISTIC regression (y or n)?

Answer <Y> or <y> for yes or <N> or <n> for no and hit <RETURN>. Remember, for logistic regression the dependent variables (the historic data in that row) must be between, but not equal to, 0 and 1.

The independent variables will appear (see Fig. 21). Currently the table contains only youth unemployment (UNY) and a dummy for each fiscal year (DM8 for FY78, DM9 for FY79, etc.). Appendix A contains the definition and calculation method for youth unemployment within the definition for *regression independent variables*.

Reg. variables are coded as shown below: Hit <RETURN> to continue.

** = Regression var. 1.2 = Force coef. to be 1.2 (or ?) Blanks are omitted*

1	2	3	4	5	6	7	8	9	10
	FYS	UNY	DM8	DM9	DM0	DM1	DM2	DM3	DM4
0.861	82	22.30	0.00	0.00	0.00	0.00	1.00	0.00	0.00
0.888	83	22.60	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.931	84	19.78	0.00	0.00	0.00	0.00	0.00	0.00	1.00
0.927	85	18.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.933	86	18.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.929	87	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	88	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	90	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	91	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	93	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	94	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	95	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	96	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	98	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Fig. 21—Independent variable table for use in regressions

This indicates that what you should do now is designate the regression variables to be used. Hit <RETURN> to continue.

Designations of Independent Variables OK ? :

Answer <Y> or <y> if you are satisfied with the designations as they stand, or <N> or <n> if you wish to change them. For instance, you respond <N>. The cursor will place itself in the first cell of the designation row just below the name of that variable and just above the data. If you wish to use that variable type <*>, hit <RETURN> and, using the arrow keys, move the cursor to the column of the next variable you wish to use. If you wish to force the coefficient of any variable type in that coefficient (for example, 1.2) and hit <RETURN>. Failure to designate any independent variables will result in a 1-2-3 error. Do <CTRL>-<BREAK> twice and <ALT>-<M> to restart.

You will notice that, depending on what type of table you are forecasting, the first cell under the fiscal year (FYS) column of the independent variables will change. It may be 80 or 81, etc. This is because the first "good" year of history varies depending on when the master data base at the Defense Manpower Data Center (DMDC) started using the full-time and military technician designator for that group. Only "good" years of history are used in the regressions.

In the event that you wish to enter new independent variables or change the values of the independent variables, see Appendix E.

When you are done designating variables hit <RETURN> again without entering anything.

Use this setup on several rows of your table? :

Enter <Y> or <y> if you wish to use the designated regression variables and forced coefficients to do regressions on more than one row of your table (<N> or <n> if not).

Response <Y>. The cursor will move to the cell in YoS <1 to the right of the last year of forecast in the matrix you are working on.

*Now you will mark (e.g. with *) each row you want to regress.*

Hit <RETURN> when you're ready to mark your rows.

Hit <RETURN>. The screen changes but the cursor will still be in the same cell. Put an asterisk <*> into each row that you wish to do this regression on. Hit <RETURN> again without any entry when you are ready to continue.

Response <N>. The regression will now be performed on the row that contained your cursor when you chose *Regression (new)*. If for any reason your regression cannot be performed as designed you will receive the message

You have a problem with dependent variables here.

Hit <RETURN> to resume work.

At its completion, the cursor will sit in the column to the left of the table of independent variables, and the regression menu will appear.

Response <Y> or <N>. For each regression that is successfully performed the METHOD column will contain the R-squared value as well as the regression equation, and the regression coefficients and constant will be located farther to the right on the worksheet. In any row where a regression could not be performed for any reason the METHOD column will contain a message to that effect. When you hit <RETURN> the cursor will return to the first forecast year in your current row and the menu will reappear.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Regression (new)
Use this regression

The regression line will be put into the current row's forecast columns, and the cursor will locate on the CONSTANT column of the current row. The METHOD column will contain the R-squared value as well as the regression equation, and the columns to its right will contain the regression constant and coefficients. Again, hit <RETURN> to return to the menu.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Regression (new)
Output

This will show you the regression output (see Fig. 22), as well as the prompt

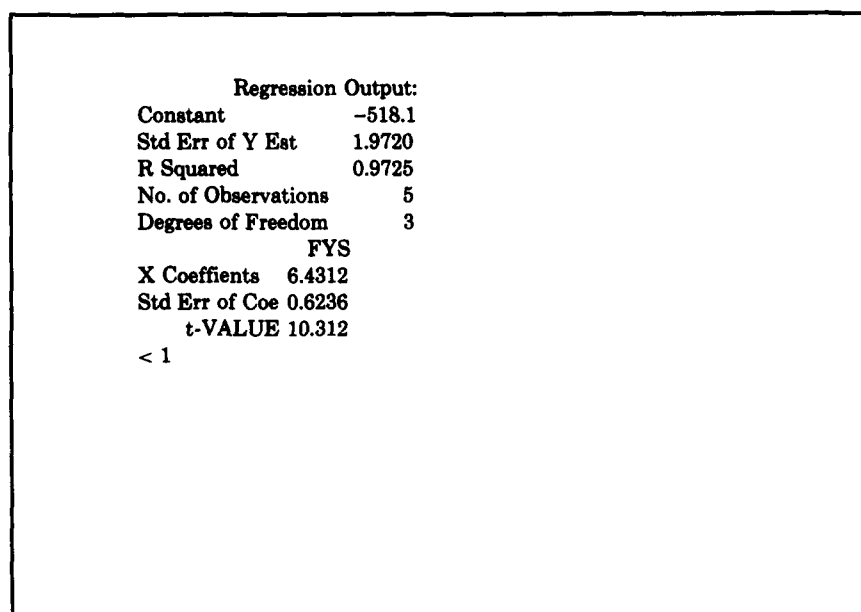


Fig. 22—Regression (new) output

Hit <RETURN> to continue

in the second row of the panel. Hit <RETURN> to return to the regression menu.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Regression (new)
Data matrix

The *Data matrix* is the matrix of regression (independent) variables. Again, follow the prompt in the panel to return to the regression menu (see Fig. 21).

Decisions Module
Accessions or Population
Locate
some table
Forecast
Regression (new)
Graphs

Y vs Y-Hat	Timeline
------------	----------

Graphs will show you two premade graphs, based on your regression, which you may find useful in determining the value of using this regression to forecast the current row.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Regression (new)
Graphs
Y vs Y-Hat

Y vs Y-Hat is a scatter diagram of Y vs Y-Hat (actual value of dependent variable vs predicted value of dependent variable) from your regression. The title at the top of the graph is the YoS of the row you regressed. To continue hit <RETURN> to return to the regression menu.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Regression (new)
Graphs
Timeline

The *Timeline* is a graph of the actual data for the current row vs the regression line. To continue hit <RETURN> to return to the regression menu.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Regression (new)
Abort regression

By aborting the regression you leave the forecast for the current row as it was before performing the regression. The cursor will be located at the row you attempted to regress and the forecast method menu will appear.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Use old reg. form's

This menu choice will allow you to change the values of the independent variables and then redo all of the regressions using the old formula(s) and the new values.

The cursor will move to the right of the METHOD column so that you can see the regression formula(s) already used, and the prompt appears

*After you adjust future ind. var's, your old regression formulas will be used.
Press <RETURN> to continue*

Upon hitting <RETURN> the cursor will move to the first column of forecast in your current row so that you can view the historic data and again you will be prompted

*Next, "range input" will let you fix any of the independent var. forecasts.
Hit <RETURN> to continue.*

The table of independent variables will appear and it will be highlighted to indicate that you are in "range input." This means that you may input numbers into any of the highlighted cells but cannot move the cursor outside this range. Make your changes at will and then hit <RETURN> again without entering anything. If you want to make these changes permanent to the set of independent variables, see

Appendix E. The new forecast will be performed on all rows that contained a valid regression. The cursor will stop at the bottom and to the right of the METHOD column to indicate that all rows have been checked and changed if they contained a regression. Hit <RETURN> to continue as the prompt indicates. The menu will return.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Exponential smoothing

Graph	Use smoothed forecast	Abort smoothing	Work Alone
-------	-----------------------	-----------------	------------

In exponential smoothing, the forecast of each year is simply the weighted sum of the previous forecast and the last observation, adjusted for the trend (slope) of the observations. (See Appendix E for details and equations.) Only the row that the cursor is on will be smoothed.

Once the smoothing procedure is complete, you will see the cursor sitting on a column of numbers in the cell that contains the value for the first year of forecast. The menu will appear in the panel.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Exponential smoothing
Graph

Graph will plot together the actual historic data and the smoothed line. The title at the top is the YoS of the current row that was smoothed. Hit any key to return to the menu.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Exponential smoothing
Use smoothed forecast

Once you choose to use the smoothed forecast the cursor will return to the last year of forecast in the current row and you will see the last five years of forecast as well as the METHOD column that will display EXP SMOOTHED. Hit <RETURN> as the prompt in the panel indicates. The cursor will return to the first year of forecast in the current row and the menu will return.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Exponential smoothing
Abort smoothing

When the smoothing is aborted the data fields that drive it are all reset. The cursor will return to the first year of forecast in the current row and the menu will return. No change will have been made to the previous forecast of that row.

Decisions Module
Accessions or Population
Locate
some table
Forecast
Exponential smoothing
Work alone

Work Alone releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

Decisions Module
Input New Data

Input New Data returns you to the beginning of the menu system for this module so that you may input new data (making decisions on

component, rank category, etc.) for a new session of forecasting and decision making.

Decisions Module

Finish

If you are working on accessions *Finish* will allow you to indicate your preference for the kind of accession survival rates you wish to use:

Backward Access. Surv. Rates	Forward Access. Surv. Rates
------------------------------	-----------------------------

A table of accession survivors will be generated using the forecast accessions and the survival rate you have chosen. Then you may indicate which rows will be first- and second-choice accessions. *Finish* must be performed for any accession decision session before the decisions are saved. The PROJECTION MODULE expects to find accession survivors in the saved table.

If you are working on population continuation rates, choosing *Finish* will return the prompt:

Not required for population data.

Hit <RETURN> to continue.

Once the table of accession survivors has been formed the cursor is located in a blank column in the table of accession survivors between the row description column and the first year of forecast.

Do you wish to start with the default choices (y or n)?

If you have a file of choices other than the default you may enter <n> or <N> at this point.

What is the name of your 'choice' file?

Enter the file name, including the extension if that extension is not .wk!, and hit <RETURN>. That file will be combined at the cursor. If you decided to use the default choices that file will be combined.

Do you wish to change any of these choices (y or n)?

Answer <N> or <n> to proceed without making any changes. Answer <Y> or <y> to make any changes to the displayed choices. The cursor will position itself over the first cell in the column of choice numbers. An informative prompt will appear in the panel:

*Hit <RETURN> to change a choice or <↓> to leave alone.
Move cursor over any blank cell to quit.*

Hit <RETURN> to remove the prompt and then as the instructions said, hit <RETURN> to change the choice that the cell is on. Choices may be only 1 or 2. First-choice accessions are those that will be considered supply-limited in the PROJECTION MODULE. Second-choice accessions will be demand-limited. If the choice is currently 1, hitting <RETURN> will change it to 2. Hitting <RETURN> again will change it back to 1. To leave that choice as is hit <↓>. You may use the <↑> key to return to any choice. When you are done changing choices move the cursor over a blank cell and hit <RETURN>.

Do you wish to save these choice indicators for later use (y or n)?

Answer <N> or <n> to proceed without saving these changes. If you have made changes that you wish to save, answer <Y> or <y>. You will be prompted for a file name:

Enter xtract file name: "some path"

Enter the file name, including the extension if that extension is not .wk!, and hit <RETURN>. If a file by that name has already been saved you will be prompted:

Cancel Replace

Choose *Replace* to overwrite the old file with the new, or *Cancel* to abort the save, and then hit <RETURN> again to complete, the table preparation that is necessary for the PROJECTION MODULE. This preparation involves creating another column and then converting the 1's and 2's from the choice column into flags (0 or 1), all of which is done without your intervention.

Once the accession survivor table has been completed, you are returned to a menu that allows you to change rows and graph the results. To proceed to the main menu to *Save* the results do <ESC> <ESC>.

Decisions Module

Save

It is always necessary to *Save* any work done in each module. It is never done automatically. After choosing *Save* you will be prompted for a file name:

Enter save file name: "directory name"

Enter the file name, including the extension if that extension is not .wk!, and hit <RETURN>. If a file by that name has already been saved you will be prompted:

Cancel Replace

Choose *Replace* to overwrite the old file with the new, or *Cancel* to abort the save. If you choose to *Cancel* you will get the *Enter save file name* prompt, again.

Decisions Module

Work alone

Work Alone releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

Decisions Module

Quit

Quit will allow you to exit this module and return to TOPMENU (see Fig. 23). You will be prompted about saving a file to insure that you have done so if you intend.

Do you wish to leave without further saving (y or n)?

Answer <Y> or <y> to exit to the module menu (TOPMENU), or <N> or <n> to return to the menu and *Save*.

Example

You need to forecast total accessions, accession survival rates, and continuation rates. First we will do the total accessions. After you have chosen the DECISIONS MODULE from TOPMENU do the following when the worksheet comes up:

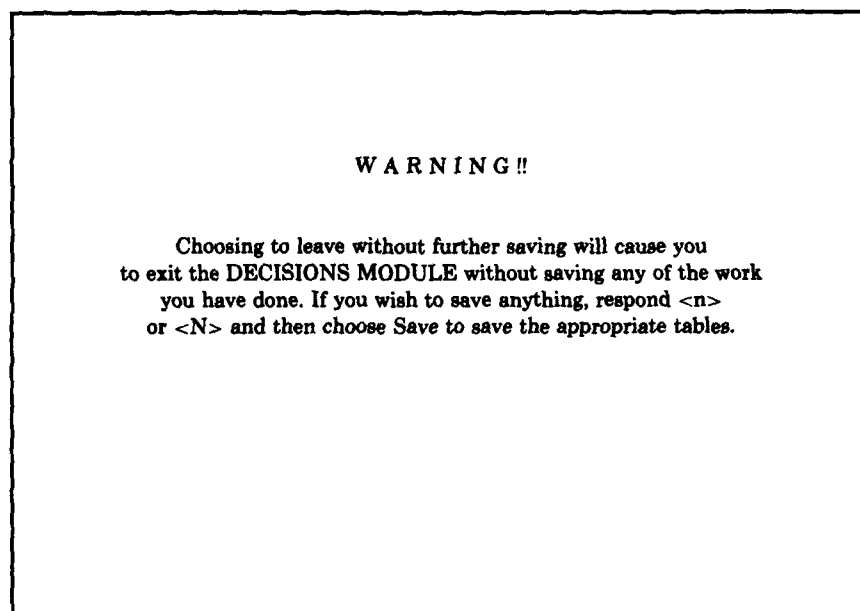


Fig. 23—Exit message in the DECISIONS MODULE

- 1) 1) ARNG
- 2) Enlisted
- 3) Part-time
- 4) Accessions

Wait for the data to load, then do

- 5) Locate
- 6) Total counts

and the table will appear (see Fig. 24).

Assume that for prior service accessions, in YoS 1-11 the unemployment elasticity is 0.3. We will calculate the coefficient of unemployment as

$$\text{coefficient} = 0.3 * \frac{\text{avg. of dep. vars. (FY82-FY87)}}{\text{avg. of indep. vars. (FY82-FY87)}}$$

(see Table 2)

FY82-FY87 is used because those are the years of history for which the data tapes properly classified ARNG reservists as full-time, part-time,

SELECTED RESERVE PART-TIMERS ARMY NATIONAL GUARD ENLISTED TOTAL ACCESSION COUNTS—ADJUSTED YEARS OF SERVICE BY FILE YEAR								
YOS	FY79	FY80	FY81	FY82	FY83	FY84	FY85	FY86
< 1	34171	51235	52349	51560	45727	48215	41238	44520
1	5760	3312	3690	3710	3537	2943	2792	2701
2	1099	1589	1560	1829	2189	2033	2298	2322
3	2307	3340	2914	3353	4647	4236	4355	4701
4	2532	3768	3471	3543	4407	4713	4936	4711
5	1894	2929	2947	2924	3004	3130	3729	3144
6	9764	13114	14150	14331	13118	10884	12154	9551
7	2713	3685	3757	3842	3698	3220	3526	2807
8	1693	2459	2338	2185	2072	1924	2162	1670
9	1273	2004	1959	1847	1570	1542	1795	1509
10	908	1411	1488	1402	1195	1237	1443	1228
11	553	973	1014	980	832	863	959	849
12	427	750	760	763	668	706	786	683

Fig. 24—Table of total accessions in the DECISIONS MODULE

or military technicians. Do this calculation separately to get the results in Table 2.

Now you want to forecast total accessions for YoS 1-11 using regression (new) and force the coefficient of regression to be 58.23 in YoS 1, 33.52 in YoS 2, etc. Do

- 7) Row Change
- 8) <↓> <RETURN>
- 9) Forecast
- 10) Regression (new)
- 11) <N> in response to "Logistic" prompt <RETURN>
- 12) <RETURN> to get by "variable designation" prompt
- 13) <N> <RETURN> in response to "designation" prompt (see Fig. 25)
- 14) <→> until you get to column labeled UNY
- 15) 58.23 <RETURN> to get coefficient

You have discovered that the data for FY82 are funny (hypothetically), so you choose to eliminate that year.

2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11
FYS	UNY	DM8	DM9	DM0	DM1	DM2	DM3	DM4	DM5
82	22.30	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
83	22.60	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
84	19.78	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
85	18.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
86	18.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	17.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Fig. 25—Table of independent variables for regression in the DECISIONS MODULE

Table 2

DEPENDENT AND INDEPENDENT VARIABLES USED IN CALCULATIONS

YoS	FY82	FY83	FY84	FY85	FY86	FY87	Results
Dependent Variables							
1	0.884	0.877	0.907	0.901	0.918	0.906	58.23
2	0.836	0.851	0.887	0.860	0.892	0.881	33.52
3	0.872	0.866	0.883	0.865	0.908	0.880	65.86
4	0.886	0.876	0.902	0.895	0.900	0.876	72.31
5	0.905	0.891	0.914	0.908	0.898	0.878	51.98
6	0.940	0.932	0.961	0.961	0.951	0.921	174.37
7	0.909	0.897	0.919	0.930	0.915	0.908	49.64
8	0.920	0.916	0.911	0.934	0.920	0.881	31.79
9	0.895	0.921	0.897	0.942	0.930	0.884	23.91
10	0.905	0.875	0.911	0.936	0.918	0.864	19.55
11	0.920	0.896	0.895	0.944	0.907	0.882	13.62
Independent Variables							
UNY	22.30	22.60	19.78	18.68	18.38	17.25	

- 16) <→> to DM2 (Dummy for 1982)
- 17) <*> <RETURN> <RETURN> to eliminate 1982 from the regression and leave data entry mode
- 18) <N> <RETURN> to "several rows" prompt
- 19) Output

You see the results in Fig. 26.

Regression Output:	
Constant	2450.1
Std Err of Y Est	1244.1
R Squared	0.2238
No. of Observations	6
Degrees of Freedom	4
DM2	
X Coeffients	1463.9
Std Err of Coe	1362.9
t-VALUE	1.0741
1	
5213	
5777	
3844	
3261	

Fig. 26—Regression output from the example in the DECISIONS MODULE

- 20) <RETURN> to continue
- 21) Use this regression

The results and the formula are written into the total accessions matrix, and you are looking at the formula (see Fig. 27)

- 22) <RETURN> to continue (see Fig. 28)

Repeat steps 7 through 20 for YoS 2-11. Since YoS <1 (NPS accessions) and YoS 12-40, 40+, and unknown are to be forecast using the most recent year (MRY) method (which is the default forecast we began with), we are done with this table.

METHOD	CONSTANFORCED	FYS	UNY
Most Recent Year			
RSQ:0.00 +58.23UNY +2450.12 +12450.1 F: UNY			58.23
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			
Most Recent Year			

Fig. 27—METHOD column after regression in the example in the DECISIONS MODULE

FY86	FY87	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95
0.933	0.929	0.959	0.972	0.986	1.000	1.013	1.027	1.040	1.054
0.918	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906
0.892	0.881	0.881	0.881	0.881	0.881	0.881	0.881	0.881	0.881
0.908	0.880	0.880	0.880	0.880	0.880	0.880	0.880	0.880	0.880
0.900	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876
0.898	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878
0.951	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921
0.915	0.908	0.908	0.908	0.908	0.908	0.908	0.908	0.908	0.908
0.920	0.881	0.881	0.881	0.881	0.881	0.881	0.881	0.881	0.881
0.930	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.884
0.918	0.864	0.864	0.864	0.864	0.864	0.864	0.864	0.864	0.864
0.907	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882	0.882
0.930	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852	0.852

Fig. 28—Total accession table after regression in the example in the DECISIONS MODULE

For the accession survival rates we will use the forward rates and the MRY method of forecast. Since this was done automatically, we need only check to be sure there are valid numbers in each cell (i.e., if a particular cell were derived from a division by zero it would have no value). <ESC> back to the menu where you can chose *Locate*, if necessary, and do

- 1) Locate
- 2) Forward Surv. Rates
- 3) Row Change

You may now move the cursor at random through the matrix to determine its contents. In particular, you should move it to the FY87 column (since that is the MRY column) and down through it. In all cases where there are invalid entries do

- 4) <RETURN>
- 5) Work Alone
- 6) Change the offending numbers according to some rule
- 7) Copy them from FY87 through FY00
- 8) <ALT>-<M> to return to the menu system (continue with 6 below)

In the event there are no invalid entries you would do

- 4) <RETURN>
- 5) <ESC> <ESC>
- 6) Finish
- 7) Forward Access. Surv. Rates

Now the table of accession survivors is being calculated

- 8) <Y> <RETURN> in response to "default choices" prompt
- 9) <Y> <RETURN> in response to "change choices"
- 10) <RETURN> to continue (see Fig. 29)

We have decided to make NPS accessions second choice and PS accession first choice.

- 11) <RETURN> to make YOS <1 (NPS) second choice
- 12) <↑> <↑> <↑> <RETURN> to stop changing choices
- 13) <N> <RETURN> to "save" prompt

The choices are now being changed to flags and the menu returns (see Fig. 30).

SELECTED RESERVE PART-TIMERS ARMY NATIONAL GUARD ENLISTED FORWARD FORECAST ACCESSIONS YEARS OF SERVICE BY FILE YEAR								
YOS	Choice	FY88	FY89	FY90	FY91	FY92	FY93	FY94
< 1	1	41279	41279	41279	41279	41279	41279	41279
1	1	3130	3130	3130	3130	3130	3130	3130
2	1	1948	1948	1948	1948	1948	1948	1948
3	1	3917	3917	3917	3917	3917	3917	3917
4	1	4294	4294	4294	4294	4294	4294	4294
5	1	3003	3003	3003	3003	3003	3003	3003
6	1	9715	9715	9715	9715	9715	9715	9715
7	1	2824	2824	2824	2824	2824	2824	2824
8	1	1724	1724	1724	1724	1724	1724	1724
9	1	1326	1326	1326	1326	1326	1326	1326
10	1	1055	1055	1055	1055	1055	1055	1055
11	1	751	751	751	751	751	751	751
12	1	712	712	712	712	712	712	712

Fig. 29—Forecast accession with CHOICE column in the example in the DECISIONS MODULE

SELECTED RESERVE PART-TIMERS ARMY NATIONAL GUARD ENLISTED FORWARD FORECAST ACCESSIONS YEARS OF SERVICE BY FILE YEAR								
YOS	ACCI	ACCII	FY88	FY89	FY90	FY91	FY92	FY93
< 1	0	1	41279	41279	41279	41279	41279	41279
1	1	0	3130	3130	3130	3130	3130	3130
2	1	0	1948	1948	1948	1948	1948	1948
3	1	0	3917	3917	3917	3917	3917	3917
4	1	0	4294	4294	4294	4294	4294	4294
5	1	0	3003	3003	3003	3003	3003	3003
6	1	0	9715	9715	9715	9715	9715	9715
7	1	0	2824	2824	2824	2824	2824	2824
8	1	0	1724	1724	1724	1724	1724	1724
9	1	0	1326	1326	1326	1326	1326	1326
10	1	0	1055	1055	1055	1055	1055	1055
11	1	0	751	751	751	751	751	751
12	1	0	712	712	712	712	712	712

Fig. 30—Forecast accessions table in the example in the DECISIONS MODULE after CHOICES become flags

- 14) <ESC> <ESC> to get to the main menu
- 15) Save
- 16) Give a file name (ex. DECACC)
- 17) <RETURN> the file is saved

Now for the second scenario (unemployment increasing over five years to its highest level in the historical years 1982-1987. Do

- 1) Locate
- 2) Total Counts
- 3) Forecast
- 4) Use old reg. form's
- 5) <RETURN> to get by prompt
- 6) <RETURN> to get by prompt
- 7) Under UNY change as in Table 3
- 8) <RETURN> after no entry in the current cell, to start the regression

After some time the regression is through.

- 9) <RETURN> to get menu back
- 10) <ESC> <ESC>
- 11) Finish
- 12) Forward Access. Surv. Rates

Table 3

CHANGES TO YOUTH UNEMPLOYMENT
FOR DECISIONS MODULE EXAMPLE

FYS	UNY
88	18.32
89	19.39
90	20.46
91	21.53
92	22.60
93	22.60
94	22.60
95	22.60
96	22.60
97	22.60
98	22.60
99	22.60
00	22.60

- 13) <Y> <RETURN>
- 14) <Y> <RETURN>
- 15) <RETURN>
- 16) <RETURN>
- 17) <↑> <↑> <↑> <RETURN>
- 18) <N>
- 19) <ESC> <ESC>
- 20) Save
- 21) Give a file name (ex. DECACC2) <RETURN>

Next, we need to forecast population continuation rates. Do

- 1) Input new data
- 2) 1)ARNG
- 3) Enlisted
- 4) Part-time
- 5) Population

After the data loads do

- 6) Locate
- 7) Forward Continuation Rates (see Fig. 31)

Using the same unemployment elasticity as before (0.3) calculate separately the logistic coefficient which corresponds to the elasticity. This formula is:

$$\text{coefficient} = 0.3 / [(1 - \text{avg. of dep. vars.}) * (\text{avg. of indep. vars.})]$$

Table 4 contains the values and results.

Now forecast the forward continuation rates for YoS 1-11 in the same manner as you did the total accessions, including the dummy for FY82, but answer <Y> to the prompt concerning logistic regression.

To finish this session you need to use *Row Change*, again, to be sure all cells contain valid numbers. Follow the steps that you used for forward accession survival rates to do this chore. Then save the tables with *Save*. For this example the file name we will use is DECRAT. The user-supplied directory name (from SETUP), USER, is automatically supplied.

Finally, we need to change the unemployment rate for the second scenario and redo the regressions. Follow the steps we used for total accessions (noting that the first unemployment rate listed is for FY87 and should not be changed—start with FY88) and then save (DECRAT2).

SELECTED RESERVE PART-TIMERS ARMY NATIONAL GUARD ENLISTED FORWARD CONTINUATION RATES—ADJUSTED YEARS OF SERVICE BY FILE YEAR								
YOS	FY78	FY79	FY80	FY81	FY82	FY83	FY84	FY85
< 1	0.781	0.821	0.812	0.796	0.785	0.807	0.784	0.808
1	0.795	0.802	0.800	0.796	0.775	0.797	0.761	0.768
2	0.790	0.814	0.781	0.793	0.775	0.784	0.760	0.759
3	0.768	0.787	0.768	0.758	0.780	0.805	0.779	0.787
4	0.748	0.796	0.769	0.790	0.781	0.824	0.798	0.795
5	0.486	0.570	0.555	0.601	0.614	0.642	0.600	0.597
6	0.606	0.648	0.651	0.690	0.705	0.707	0.705	0.705
7	0.692	0.711	0.704	0.752	0.760	0.773	0.762	0.767
8	0.751	0.768	0.732	0.793	0.791	0.800	0.781	0.790
9	0.789	0.799	0.751	0.814	0.808	0.804	0.790	0.806
10	0.824	0.840	0.763	0.848	0.840	0.822	0.818	0.821
11	0.846	0.861	0.776	0.871	0.856	0.847	0.833	0.830
12	0.884	0.891	0.788	0.879	0.863	0.853	0.842	0.843

Fig. 31—Table of forward continuation rates in the
DECISIONS MODULE

Table 4

DEPENDENT AND INDEPENDENT VARIABLES USED IN CALCULATIONS

YoS	FY82	FY83	FY84	FY85	FY86	Results
Dependent Variables						
1	0.775	0.797	0.761	0.768	0.757	.066
2	0.775	0.784	0.760	0.759	0.753	.065
3	0.780	0.805	0.779	0.787	0.772	.071
4	0.781	0.824	0.798	0.795	0.791	.076
5	0.614	0.642	0.600	0.597	0.573	.038
6	0.705	0.707	0.705	0.705	0.707	.050
7	0.760	0.773	0.762	0.767	0.784	.066
8	0.791	0.800	0.781	0.790	0.796	.073
9	0.808	0.804	0.790	0.806	0.804	.076
10	0.840	0.822	0.818	0.821	0.831	.087
11	0.856	0.847	0.833	0.830	0.827	.092
Independent Variables						
	22.30	22.60	19.78	18.68	18.38	

INVENTORY PROJECTION MODULE

The INVENTORY PROJECTION MODULE (see Figs. 32 and 33) is a template for projecting historic data based on the decisions you made in the DECISIONS MODULE. It is also a good place to do some simple sensitivity analysis by making small changes in continuation rates, accessions, and end strengths.

The default end strength is preset at the same level as the most recent year of history. To change it or any other data on the worksheet use the *View Data* menu choice to locate the data, then <RETURN> <ESC> and *Work Alone*.

Load	View Data	Project	Save Projection	Work Alone	Quit
------	-----------	---------	-----------------	------------	------

Inventory Projection Module

Load

Through this menu choice you will define the files you wish to use to project the most recent year of history to the fiscal year 2000.

What's the name of the access. file from the DECISIONS MODULE?

Enter a valid file name, including directory name, and hit <RETURN>.

What's the name of the rates file from the DECISIONS MODULE?

Enter a valid file name, including directory name, and hit <RETURN>.

Move through the following menus to identify the group you are working with and all the necessary tables will be loaded.

1) ARNG	2) USAR	3) ANG	4) USAFR	5) USNR	6) USMCR
---------	---------	--------	----------	---------	----------

Full-time	Part-time	Military Tech.	Disaggregated
-----------	-----------	----------------	---------------

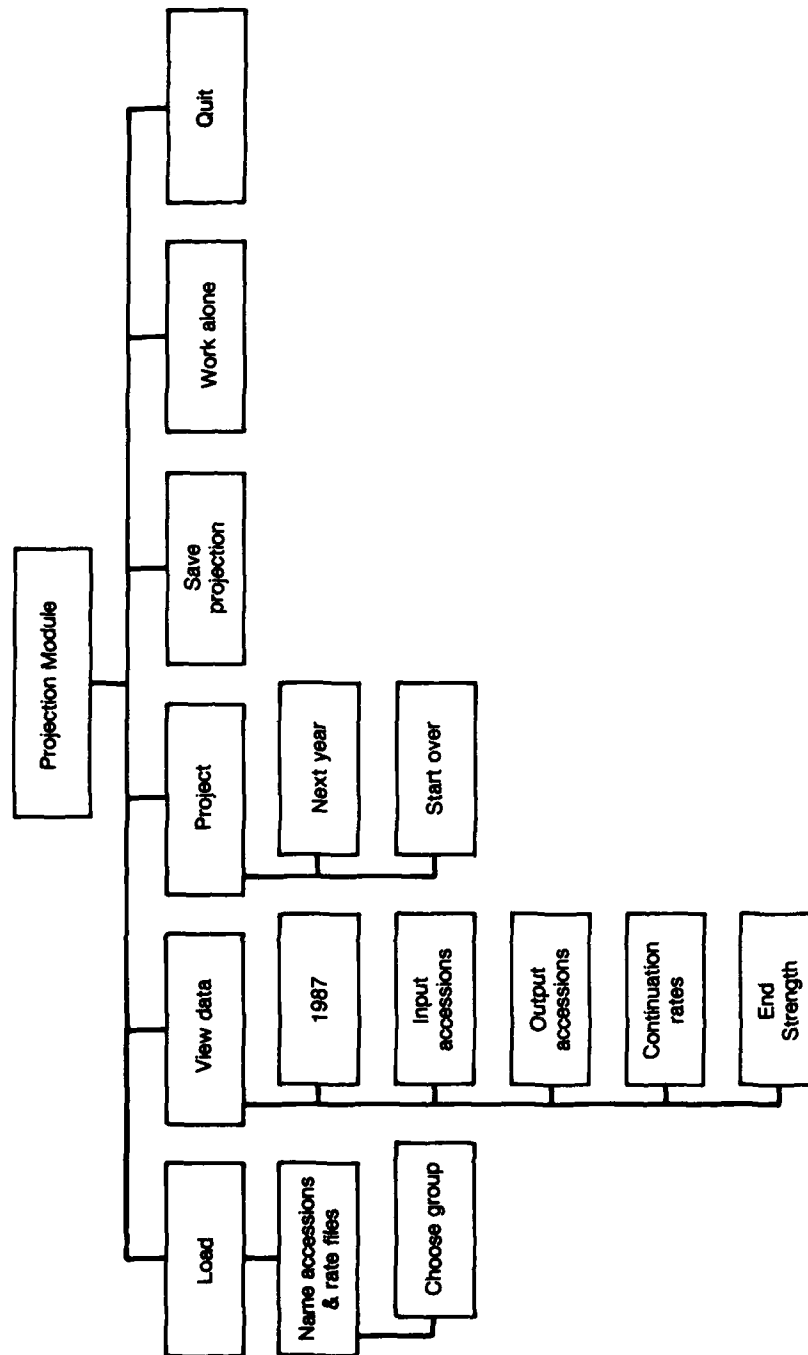


Fig. 32—Menu system for the INVENTORY PROJECTION MODULE

Enlisted	Officer
----------	---------

Backward Rates	Forward Rates
----------------	---------------

If any of the files you have named are not present in the current directory the macro will crash and you will get a 1-2-3 message indicating that the file does not exist. At this point you must hit <ESC> and restart the macros with <ALT>-<M>, and then reenter the file names and other choices.

Once the data are loaded, the screen will show the last year of historic data and the panel will display the main menu for this module.

RAND Reserve Force Policy Screening Model:
POSM

Welcome to the PROJECTION MODULE

This module uses the decisions you
made in the DECISIONS MODULE to
project the population of your choice.

Choose Load in the first menu to load the history and decision files.

Hit RETURN to start loading forecasts (& history).

Fig. 33—Opening screen of the INVENTORY
PROJECTION MODULE

Inventory Projection Module View Data

1987	Input Access.	Output Access.	Cont. Rates	End Strength
------	---------------	----------------	-------------	--------------

Choose from among the data choices in the menu and listed below. Once the table is on the screen, you are free to move the cursor around to view the table better. When you are done and wish to return to the menu system do <RETURN>. If you wish to make any changes you must return to the menu by <RETURN>, <ESC> back to the main menu, and do *Work Alone*. Then make your changes and do <ALT>-<M> to return to the menu system. Be sure that after making changes you always choose *Start Over* from the projection menu before choosing *Project*. This will reinitialize the formulas used in projection to contain your new data. Choose the data to view:

1987—inventory counts for the most recent year of history.

Input Access.—the accession survivors from the DECISIONS MODULE. Choices are to the left of the cursor position. Move the cursor to view them.

Output Access.—these are the accessions required to meet the projected end strength with these decisions. This table will be blank until a projection is done.

Cont. Rates—the population continuation rates from the DECISIONS MODULE.

End Strength—the required and actual end strengths for the projected inventory.

Inventory Projection Module Project

Start Over	Next Year
------------	-----------

Projections are made for up to 14 years (to the year 2000). If you wish to make a longer-term projection, you must manually move data around. First you must save the projection so far through *Save*, then do *Work Alone* and move the results in the FY00 column over into the FY86 column. Do the same with the projected accessions. Finally,

return to the menu system by <ALT>-<M>, choose *Project* then *Start Over* and then *Next Year*.

Inventory Projection Module
Project
Next Year

This menu choice will start the macros that perform the mechanics of a projection after all other choices and decisions have been made. If you have made any changes since entering the INVENTORY PROJECTION MODULE or the last projection, be sure to choose *Start Over* before choosing *Next Year*.

How many years do you wish to project?

Enter a number between 0 and 13. If you enter a number larger than 13 you will receive the following message:

This Module Will Only Project to FY2000
Hit return and the projection will be made to FY2000.

Hit <RETURN> and the projection will proceed. As the projection is made you will see each new year of counts appear on the screen. Once the projection is complete the menu will return. To view the results <ESC> to the main menu and *Work Alone*.

Inventory Projection Module
Project
Start Over

Start Over reinitializes all of the module's formulas and macros to begin another projection after any of the input has been changed. Therefore if you change any of

- Accessions I
- Accessions II
- Continuation rates
- End strengths

and wish to make another projection you must do *Start Over* and then *Next Year*.

Inventory Projection Module

Save Projection

Save Projection will save the areas of the worksheet that contain the projection and the required accessions. You will be prompted for a file name

Enter save file name: "directory"

Enter the file name, including the extension if that extension is not .wk!, and hit <RETURN>. If a file by that name has already been saved you will be prompted:

Cancel Replace

Choose *Replace* to overwrite the old file with the new, or *Cancel* to abort the save. If you choose to *Cancel* you will get the *Enter save file name* prompt, again.

Inventory Projection Module

Work Alone

Work Alone releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

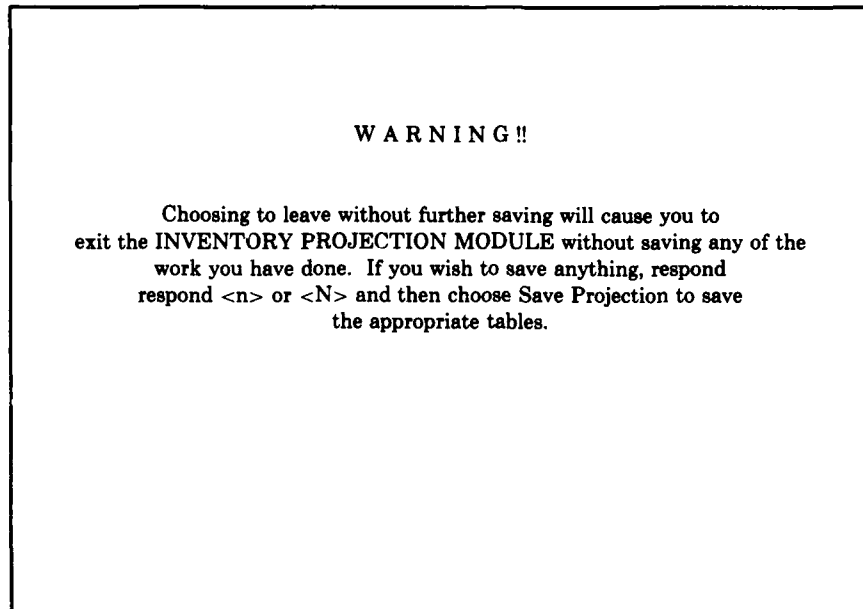
Inventory Projection Module

Quit

Choose *Quit* when you are ready to leave the INVENTORY PROJECTION MODULE (see Fig. 34). Be sure that you have saved any part of the projection that you may need later. Upon choosing *Quit* you will see the following screen

Do you wish to leave without further saving (y or n)?

Follow the instructions on this screen to exit or save and then exit. Upon exiting, the model will return to the top or module menu.



**Fig. 34—Exit message for the INVENTORY
PROJECTION MODULE**

Example

In the projection module you will take the forecasts of accession survivors and continuation rates from the DECISIONS MODULE and project to the year 2000.

When the worksheet comes up do

- 1) <RETURN> to leave the opening screen
- 2) Load
- 3) USER/DECACC <RETURN> in response to "accession file" prompt
- 4) USER/DECRAT <RETURN> in response to "rates file" prompt
- 5) 1)ARNG
- 6) Part-Time

- 7) Enlisted
- 8) Forward Rates

The data now load. Next to change the required end strength to a 2 percent per year growth do

- 9) View Data
- 10) End Strength
- 11) <RETURN> to get back menu
- 12) <ESC> Work Alone
- 13) <Down> <Right>

Now the cursor is sitting on the required end strength column in FY88 (see Fig. 35). FY87 is history, so you do not want to change it. Do

- 14) 1.02* <←> <RETURN>

END STRENGTH	366003	0	0	0	0	0
REQ'D END STR.	366003	366003	366003	366003	366003	366003

Fig. 35—End strength row before changes in the example in the INVENTORY PROJECTION MODULE

- 15) /c <RETURN> <.> <→> <→> <→> <→> <RETURN>
(see Fig. 36)
- 16) <→> <→> <→> <→> <→>
- 17) +<←> <RETURN>
- 18) /c <RETURN>.<END> <→> <RETURN>
- 19) <ALT> <M> to get back menu

Now that the new end strengths are in we will start the projection, but remember that whenever you change data you must **start over** before projecting. Do

- 20) Project
- 21) Start Over
- 22) Next Year
- 23) <13> <RETURN> in response to the "how many years" prompt

END STRENGTH	366003	0	0	0	0	0
REQ'D END STR.	366003	373323	380790	388405	396173	404097

Fig. 36—End strength row after changes in the example in the INVENTORY PROJECTION MODULE

When the projection is finished (see Fig. 37) you will save it and load the data for the second unemployment scenario. Do

- 24) <ESC>
- 25) Save Projection
- 26) Enter a file name—in this example I will enter PROJECT1

Follow steps 2-9 and 18-27 to load the second scenario using the files DECACC2 and DECRAT2, project and save (with another file name, PROJECT2 in my case). Then exit this module and enter the REPORTING MODULE.

Army National Guard - Enlisted - Part Time						
YOS	FY87	FY88	FY89	FY90	FY91	FY92
< 1	41320	53029	54047	56260	58088	60307
1	35875	36686	46194	47021	48818	50302
2	27221	28470	29069	36099	36710	38039
3	28567	23848	24762	25201	30348	30796
4	25582	25812	22257	22946	23276	27153
5	24653	22674	22851	20117	20647	20901
6	21792	23995	22849	22951	21368	21675
7	20218	17601	19095	18318	18387	17313
8	17575	16677	14741	15846	15271	15323
9	13664	14661	13980	12511	13350	12913
10	13261	11541	12306	11783	10656	11299
11	12542	11199	9843	10446	10034	9146
12	10101	10726	9654	8571	9053	8724

Fig. 37—Projected population in the example in the
INVENTORY PROJECTION MODULE

REPORTING MODULE

The REPORTING MODULE (see Figs. 38 and 39) is a template for creating summary tables and graphs to your menu-driven specifications. You may compare or summarize any two projections of your choice or use the worksheet macros to simply gather the historic and projected data together and then create your own summary charts, using the worksheet as a "blackboard."

In this module you will receive a warning when you are prompted to enter any alphanumeric string and you enter an unacceptable string.

INVALID CHOICE!

Hit <RETURN> and try again.

Hit <RETURN> and reenter your response in the form indicated by the prompt.

You begin by specifying the kind of groups your chosen projection files represent:

1) ARNG	2) USAR	3) ANG	4) USAFR	5) USNR	6) USMCR
---------	---------	--------	----------	---------	----------

Full-time	Part-time	Military Tech.	Disaggregated
-----------	-----------	----------------	---------------

Enlisted	Officer
----------	---------

Next you will be prompted to enter the file names:

How many tables will you be using (1 or 2)?

Enter the numeral <1> or <2>. Once an appropriate entry has been made you will be prompted for the table type:

Do you want accessions or population for your first table?

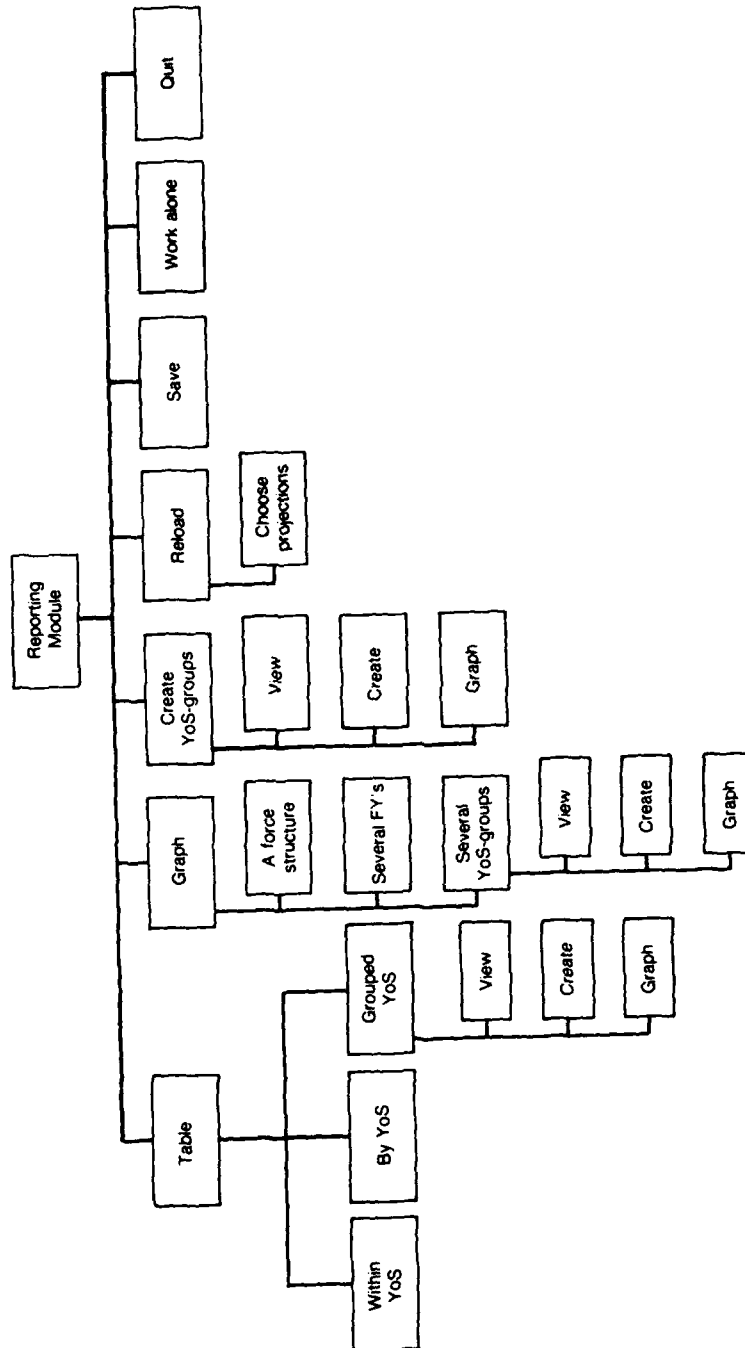


Fig. 38—Menu system for the REPORTING MODULE

Enter any word starting with <a> or <p> and then the module will load the historic data pertinent to the group you have described and you will be prompted for the table(s) you wish to summarize:

What is the file name of your first table?

If you enter a file name which does not exist in the current directory the following prompt will appear:

File does not exist

Hit <RETURN> for the main menu.

Hit <RETURN> and choose *Reload* to reenter the group and file specifications from the start. After the first projection file is loaded, and if you responded that you would use two tables, you will be prompted for the second file name in the same manner.

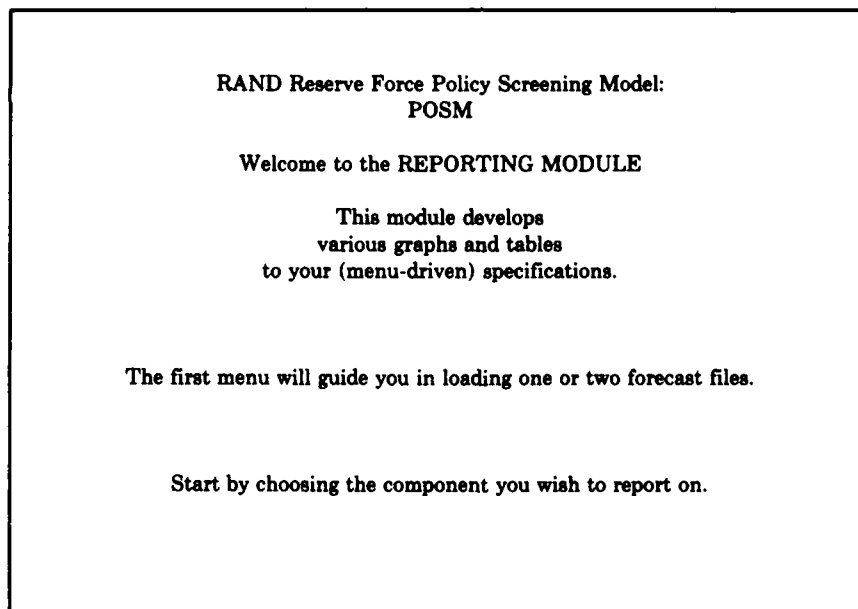


Fig. 39—Opening message in the REPORTING MODULE

When all of your history and projection data are loaded, a table is automatically created that summarizes all rows of each YoS. This table will appear on the screen along with this module's main menu.

Table	Graph	Create YoS-Groups	Reload	Save	Work Alone	Quit
-------	-------	-------------------	--------	------	------------	------

Reporting Module Table

Within YoS	By YoS	Grouped YoS
------------	--------	-------------

This menu choice will help you in viewing one of three types of tables. Once you have chosen the table you wish to view and the cursor is in that table you are allowed to move the cursor at will to view any details of that table. Once you are finished with viewing that table hit <RETURN> and you will be prompted:

Want to graph this row (y or n)?

Respond <Y> or <y> to view a graph of the row that the cursor is on. Any other response will be assumed to mean <N> or <n>. Hit any key to return to the *Table* menu.

Reporting Module Table Within YoS

If you indicated two projections the following prompt will appear:

Which table (1 or 2)?

in either case the cursor will be placed in the FY78 column and the first YoS < 1 row of the disaggregated table of the indicated projection.

Reporting Module
Table
By YoS

If you indicated two projections the following prompt will appear:

Which table (1 or 2)?

in either case the cursor will be placed in the FY78 column and the YoS < 1 row of the YoS summary table of the indicated projection.

Reporting Module
Table
Grouped YoS

View table	Create table	Graph several rows
------------	--------------	--------------------

Through this menu choice you will be able to create user-defined YoS groupings and subsequently view them.

Reporting Module
Table
Grouped YoS
View table

If you indicated two projections the following prompt will appear:

Which table (1 or 2)?

in either case the cursor will be placed in the FY78 column and the first row of the YoS grouping table of the indicated projection. If you have not yet created these groupings the table will be empty.

Once the cursor is placed you may move it around to view the table. When you are done hit <RETURN> again and you will get the following prompt:

Want to graph this row (y or n)?

Respond <Y> or <y> to view a graph of this row. Any other response will be assumed to be <n>. When you are done viewing the graph hit any key to return to the menu.

Reporting Module
Table
Grouped YoS
Create table

After you choose *Create*, the area(s) that will contain the final tables will be erased and the cursor will be placed in the first column and the first row of the YoS summary table. Move the cursor down so that the rows you wish to include in the first YoS grouping are covered and hit <RETURN>. Those rows will be summed and labeled and the cursor will be in the first row of the YoS summary table after the rows that you specified. Repeat this procedure until **all** rows have been included. The program will then finish creating the table(s) automatically, the cursor will position itself so that you can view the YoS grouping table for the first projection, and the *Grouped YoS* menu will reappear. If there are no values in the FY78 column of the YoS summary table there will be none in the grouped YoS table.

Reporting Module
Table
Grouped YoS
Graph several rows

After you have created the table(s) of grouped YoS this choice allows you to graph up to three rows at once to compare them.

If you indicated two projections the following prompt will appear:

Which table (1 or 2)?

In either case the cursor will be placed in the FY78 column and above the first row of a grouped-YoS table.

Hit <RETURN> and move the cursor to the row you wish to graph.

Hit <RETURN>, move the cursor, and hit <RETURN> again.

The above will be repeated for the second row. Then you will be prompted for a third row:

A third group (y or n)?

If you say yes (y) the *Which table* prompt will appear again and you continue as before.

When you have finished indicating the rows to graph the graph appears on the screen. Hit <RETURN> to get the *save* prompt:

Save this graph for later use (y or n)?

If you say yes (y) you will get the menu:

Create a picfile	Name in graph menu
------------------	--------------------

Reporting Module
Table
Grouped YoS
Graph several rows
Create a picfile

A picfile is a LOTUS picture file which is saved separately from the worksheet and must be printed using LOTUS Printgraph or LOTUS Freelance.

Enter graph file name: "path"

Type in a file name. If the filename you give already exists you will get the menu:

Cancel	Replace
--------	---------

Cancel will abort the save. *Replace* will overwrite the old file. You will have to hit <RETURN> one more time to get back to the *View table* menu.

Reporting Module
Table
Grouped YoS
Graph several rows
Name in graph menu

The graph menu exists only in the current spreadsheet. If you save a graph there you must also *Save* the spreadsheet or the graph will be

st. Be sure to give the spreadsheet a name other than #RPTXX (the module file name) because this will be your file and not part of the official model.

Enter graph name:

Type in a name to be saved as part of this spreadsheet, and the *View table* menu will reappear.

Reporting Module Graph

Structure of force	Fiscal year comparison	Grouped YoS comparison
--------------------	------------------------	------------------------

Through *Graph* you will be able to define summary graphs of the historic and projected data that you have loaded.

Once you are finished viewing any graph hit any key and you will be prompted:

Save this graph for later use (y or n)?

Reporting Module any graph with response <Y> or <y> to SAVE prompt above Create a picfile

This choice will allow you to save the graph as a picfile to print after leaving the model. You will receive the following prompt for a file name:

Enter graph file name: "path"

If the file name that you enter already exists your file will not be saved. In this event you will need to choose that graph and save it with a different name.

Reporting Module any graph with response <Y> or <y> to SAVE prompt above Name in Graph Menu

With this menu choice you are able to save this graph with the worksheet. You will be prompted for a name:

Enter graph name:

If that name already exists your new graph will overwrite the old one, otherwise the graph will be saved with the new name.

This choice will be useful if you intend to create the same set of graphs for many projections. In saving the graph with the worksheet you are actually just saving the addresses and range names associated with that graph. When you change the data, the lines or bars and titles will change, but they will represent the same range of the forecast.

Be warned! If you leave this worksheet without saving it on your own you will lose all of the graphs that you saved in this manner. Before *Quiting* do *Work Alone* and then /fs and give the worksheet a **new** name. If you save the worksheet with the old name it is unlikely to work correctly.

Reporting Module

Graph

A Force Structure

If you indicated two projections the following prompt will appear:

Which table (1 or 2)?

In either case you will receive a prompt for the fiscal year to graph:

Which FY (1978, 1979, ..., 2000)?

Enter a year according to the prompt and that column of the disaggregated table will be graphed in a bar chart.

Reporting Module

Graph

Several FY's

This menu choice will allow you to put the data of up to three fiscal years on one line graph. You will be prompted for the first two lines becomes older (higher YoS).

with the usual prompts:

Which table (1 or 2)?

and

Which FY (1978, 1979, ..., 2000)?

and then you will be prompted a third time:

A third profile (y or n)?

Answer <Y> or <y> to specify a third line with the usual prompts. Any other response will be assumed to mean <n>. The graph will be a line chart with up to three lines on it.

Reporting Module
Graph
Several YoS groups

Within YoS	By YoS	Grouped YoS
------------	--------	-------------

This menu choice will allow you to put the data of up to three rows of any table on one line graph. You will be prompted for the first two lines with the usual prompts:

Which table (1 or 2)?

then the cursor will locate one row above the first row of the table you select, in the FY78 column. Move the cursor down to the row you desire and hit <RETURN>. Repeat this for the second row and the third row (if desired). After selection of the last row the graph will appear on the screen. The legends at the bottom will signify which row and which table each line represents.

Reporting Module
Graph
Several YoS groups
Within YoS

The *Within YoS* table is the table of data from the HISTORIC INVENTORY MODULE and PROJECTION MODULE in the disaggregated form.

Reporting Module
Graph
Several YoS groups
By YoS

The *By YoS* table is the table of fiscal years by YoS. There is only one row per YoS.

Reporting Module
Graph
Several YoS groups
Grouped YoS

The *Grouped YoS* table is the table of YoS grouped according to your specifications under *Create Table*.

Reporting Module
Create YoS-Groups

View table	Create table	Graph several rows
------------	--------------	--------------------

After you choose *Create YoS-Groups*, the area(s) that will contain the final tables will be erased and the cursor will be placed in the first column and the first row of the YoS summary table. Move the cursor down so that the rows you wish to include in the first YoS grouping are covered and hit <RETURN>. Those rows will be summed and labeled and the cursor will be in the first row of the YoS summary table after the rows that you specified. Repeat this procedure until all rows have been included. The program will then finish creating the table(s) automatically, the cursor will position itself so that you can view the YoS grouping table for the first projection, and the *Grouped YoS* menu will reappear. If there are no values in the FY78 column of the YoS summary table there will be none in the grouped YoS table.

Reporting Module
Create YoS-Groups
View table

If you indicated two projections the following prompt will appear:

Which table (1 or 2)?

in either case the cursor will be placed in the FY78 column and the first row of the YoS grouping table of the indicated projection. If you have not yet created these groupings the table will be empty.

Once the cursor is placed you may move it around to view the table. When you are done hit <RETURN> again and you will get the following prompt:

Want to graph this row (y or n)?

Respond <Y> or <y> to view a graph of this row. Any other response will be assumed to be <n>. When you are done viewing the graph hit any key to return to the menu.

Reporting Module
Create YoS-Groups
Create table

After you choose *Create*, the area(s) that will contain the final tables will be erased and the cursor will be placed in the first column and the first row of the YoS summary table. Move the cursor down so that the rows you wish to include in the first YoS grouping are covered and hit <RETURN>. Those rows will be summed and labeled and the cursor will be in the first row of the YoS summary table after the rows that you specified. Repeat this procedure until **all** rows have been included. The program will then finish creating the table(s) automatically, the cursor will position itself so that you can view the YoS grouping table for the first projection, and the *Grouped YoS* menu will reappear. If there are no values in the FY78 column of the YoS summary table there will be none in the grouped YoS table.

Reporting Module
Create YoS-Groups
Graph several rows

After you have created the table(s) of grouped YoS, this choice allows you to graph up to three rows at once to compare them.

If you indicated two projections the following prompt will appear:

Which table (1 or 2)?

In either case the cursor will be placed in the FY78 column and above the first row of a grouped-YoS table.

Hit <RETURN> and move the cursor to the row you wish to graph.

Hit <RETURN>, move the cursor, and hit <RETURN> again.

The above will be repeated for the second row. Then you will be prompted for a third row:

A third group (y or n)?

If you say yes (y), the *Which table* prompt will appear again and you continue as before.

When you have finished indicating the rows to graph the graph appears on the screen. Hit <RETURN> to get the *save* prompt:

Save this graph for later use (y or n)?

If you say yes (y) you will get the menu:

Create a picfile	Name in graph menu
------------------	--------------------

Reporting Module
Create YoS-Groups
Graph several rows
Create a picfile

A picfile is a LOTUS picture file which is saved separately from the worksheet and must be printed using LOTUS Printgraph or LOTUS Freelance.

Enter graph file name: "path"

Type in a file name. If the filename you give already exists you will get the menu:

Cancel	Replace
--------	---------

Cancel will abort the save. *Replace* will overwrite the old file. You will have to hit <RETURN> one more time to get back to the *View table* menu.

Reporting Module
Create YoS-Groups
Graph several rows
Name in graph menu

The graph menu exists only in the current spreadsheet. If you save a graph there you must also *Save* the spreadsheet or the graph will be lost. Be sure to give the spreadsheet a name other than #RPTXX (the module file name) because this will be your file and not part of the official model.

Enter graph name:

Type in a name to be saved as part of this spreadsheet, and the *View table* menu will reappear.

Reporting Module
Reload

Reload will bring back the menu of components so that you may summarize one or two new projections. Choosing *Reload* will cause any previously loaded historic and projection data to be erased.

Reporting Module**Save**

Save will save the areas of the worksheet that contain the projection and the required accessions. You will be prompted for a file name

Enter save file name: "directory"

Enter the file name, including the extension if that extension is not .wk!, and hit <RETURN>. If a file by that name has already been saved you will be prompted:

Cancel	Replace
--------	---------

Choose *Replace* to overwrite the old file with the new, or *Cancel* to abort the save. If you choose to *Cancel* you will get the *Enter save file name* prompt, again.

Reporting Module**Work Alone**

As always, *Work Alone* releases the worksheet to the user without the menu system. To return to the menu system do <ALT>-<M>.

Reporting Module**Quit**

Choose *Quit* when you are ready to leave the REPORTING MODULE. Be sure that you have saved any part of the projection that you may need later. Upon choosing *Quit* you will see the following screen

Do you wish to leave without further saving (y or n)?

Follow the instructions on this screen (see Fig. 40) to exit or save and then exit. Upon exiting, the model will return to the top or module menu.

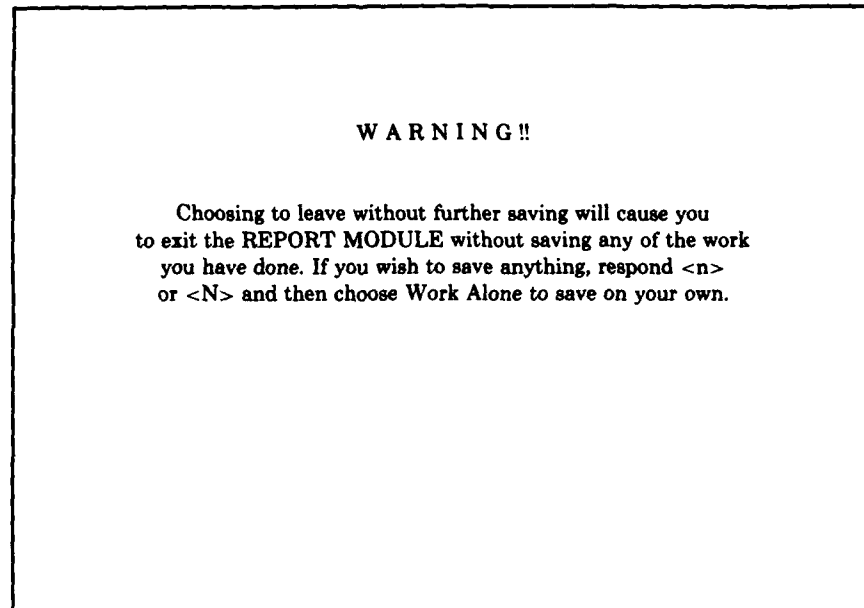


Fig. 40—Exit message in the REPORTING MODULE

Example

In the REPORTING MODULE you are able to load two tables to summarize. In this example we have created two projection files (PROJECT1 and PROJECT2) and each of them has two tables (projected population and projected accession survivors). First, let us look at the two population tables. When the worksheet comes up do

- 1) 1) ARNG
- 2) Part-time
- 3) Enlisted
- 4) <2><RETURN> in response to the "how many tables" prompt
- 5) <P><RETURN> in response to the "accessions or population" prompt
- 6) USER/PROJECT1 <RETURN> in response to the "file name" prompt

The first table is loaded. Repeat steps 5 and 6 to load the population projection for the second scenario (PROJECT2). The second table will be loaded and the summary tables calculated.

Now let us create a grouped-YoS table with five YoS to a group. Do

7) Create YoS-Groups

When the cursor is sitting next to Yos <1 do

- 8) <↓> to YoS 5
- 9) <RETURN>
- 10) <↓> to YoS 10
- 11) <RETURN>

and so on until you have formed the groups

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30+
- UNK

Note that, in this version of the model, the row labels for the table just created will have 0 instead of <1.

The table you have created for the first scenario is now on the screen (see Fig. 41). To look at the same table for scenario two do

- 12) View table
- 13) <2><RETURN> in response to the "which table" prompt

and the second table will be on the screen (see Fig. 42).

You may move the cursor over any row you would like to graph. Let us graph the row the cursor is already on (YoS 0 - 5). Do

- 14) <RETURN>
- 15) <Y><RETURN> in response to the "graph" prompt

and the graph will appear (see Fig. 43).

- 16) <RETURN>

Now, let us make a graph of YoS <1-5 comparing the two projections. Do

YOS	1978	1979	1980	1981	1982	1983	1984
0 - 5	136822	146966	164668	175000	180337	181116	191529
6 - 10	109471	95322	88881	82611	85216	86504	86448
11 - 15	31344	37638	44389	45781	50086	51759	50143
16 - 20	10275	11309	13124	12407	16018	19342	23550
21 - 25	9810	8700	7954	5450	5286	5110	5404
26 - 30+	8566	9496	10012	6197	6354	6111	5655
UNK	402	248	273	231	166	105	120
TOTAL	305114	308123	327482	326317	341930	348476	361137

Fig. 41—Table of first scenario population YoS groups
from the example in the REPORTING MODULE

YOS	1978	1979	1980	1981	1982	1983	1984
0 - 5	136822	146966	164668	175000	180337	181116	191529
6 - 10	109471	95322	88881	82611	85216	86504	86448
11 - 15	31344	37638	44389	45781	50086	51759	50143
16 - 20	10275	11309	13124	12407	16018	19342	23550
21 - 25	9810	8700	7954	5450	5286	5110	5404
26 - 30+	8566	9496	10012	6197	6354	6111	5655
UNK	402	248	273	231	166	105	120
TOTAL	305114	308123	327482	326317	341930	348476	361137

Fig. 42—Table of second scenario population YoS groups
from the example in the REPORTING MODULE

- 17) <ESC>
- 18) Graph
- 19) Grouped YoS comparison
- 20) Grouped YoS
- 21) <1><RETURN> in response to the "which table" prompt
- 22) <RETURN> to get by prompt
- 23) <↓> to position the cursor on the correct row
- 24) <RETURN>
- 25) <2><RETURN>
- 26) <RETURN> to get by prompt
- 27) <↓><RETURN>
- 28) <N><RETURN> in response to the "third profile" prompt

and the graph appears (see Fig. 44). Notice that the population in this group grows considerably faster under the "growing unemployment" or second scenario.

- 27) <RETURN> to leave the graph
- 28) <Y><RETURN> in response to the "save" prompt so that we can print the graph later
- 29) Create a picfile, which is a printable file rather than a graph within the worksheet
- 30) enter a file name, for this example use POP0_5

and the menu returns.

- 31) <ESC><ESC> to get back to the main menu.

By moving through the *Table* and *Graph* submenus you can thoroughly examine and compare these two projections. Let us look at a graph comparing the force profiles of the two scenarios for FY91. Do

- 32) Graph
- 33) Fiscal year comparison
- 34) <1><RETURN>
- 35) 1991 <RETURN>
- 36) <2><RETURN>
- 37) 1991 <RETURN>
- 38) <N><RETURN> in response to the "third profile" prompt

and the graph appears (see Fig. 45). This shows fewer reservists in the YoS <1-2 and more in the YoS 3-13 groups under scenario two (rising unemployment). Under rising unemployment reservists would be more likely to continue from year to year, and as a result fewer accessions would be needed. Since the largest accession group is YoS <1 the force becomes older (higher YoS).

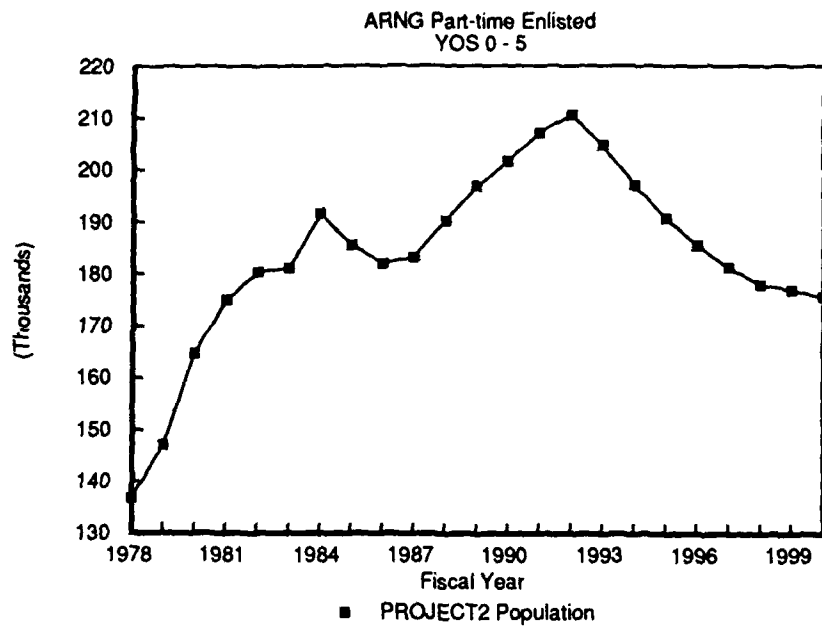


Fig. 43—Graph of projected ARNG Part-time Enlisted YoS 0-5 from the REPORTING MODULE

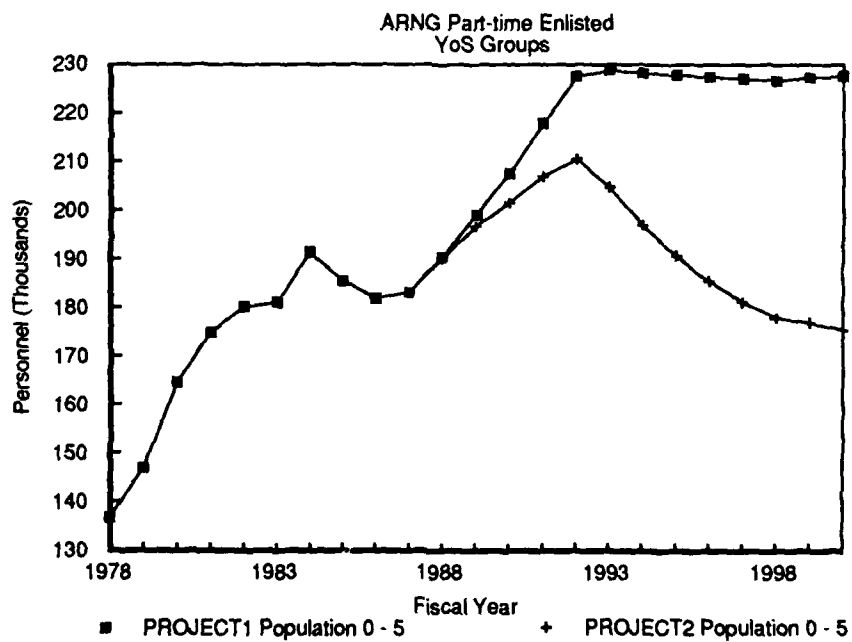


Fig. 44—Comparison of YoS 0-5 groups for two scenarios in the REPORTING MODULE

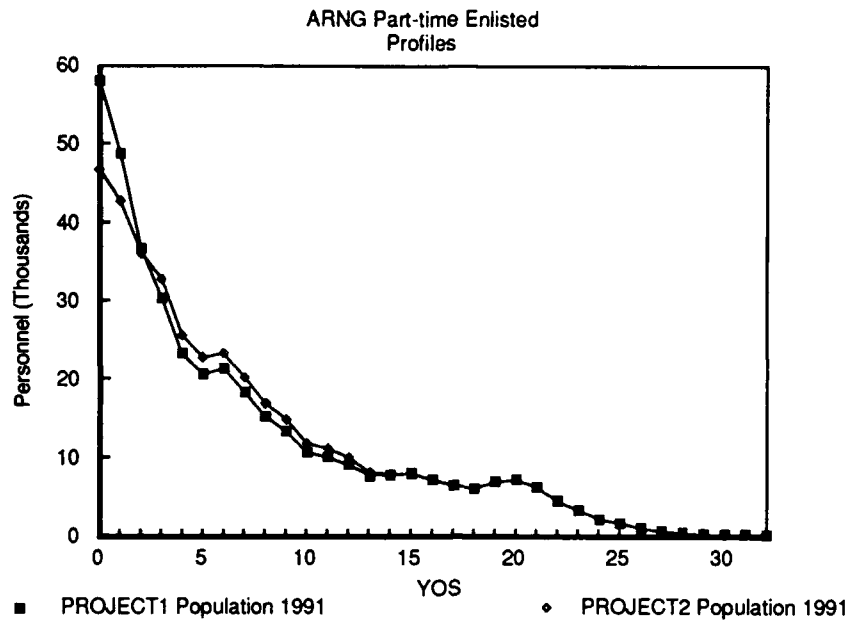


Fig. 45—Comparison of force profiles for two scenarios in the
REPORTING MODULE

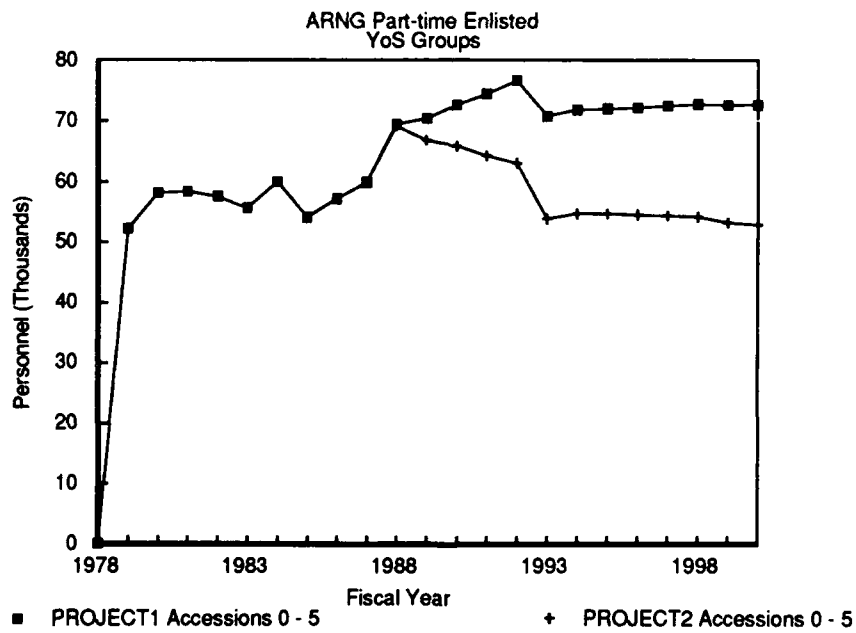


Fig. 46—Comparison of accession profiles for two scenarios in
the REPORTING MODULE

This graph may be saved in the same manner as before.

Now let us see what the accessions look like. Do *Reload* and repeat steps 1 through 11 with accessions to load the tables and form the groups. Also create the graph comparing YoS 0-5 for the two scenarios (see Fig. 46). Notice that the accessions level in scenario one is much higher. This is because the first scenario has lower continuation rates. Therefore, it requires more accessions to meet the same end strength. In both projections we chose only YoS <1 to have an unlimited supply (second choice) of accessions. So, when we run out of YoS 1-30+ prior-service accessions, we make up the gap in required accessions using nonprior-service people, as indicated by the graph.

Appendix A

DATA DEFINITIONS

The historic data were generated by the Defense Manpower Data Center in Monterey, California, from their RCCPDS files. These files contain information for each individual. The counts were obtained by matching end year tapes from consecutive years and by matching each fiscal year accession tape with the end year tape (see TAPE MATCHING).

The data are composed of four distinct sets. They are:

- The disaggregated data for enlisted reservists
- The disaggregated data for reserve officers
- The full-time/part-time/military technician data for enlisted reservists
- The full-time/part-time/military technician data for reserve officers

For each data set we obtained from the matched consecutive end year tapes and matched accession/end year tape, several sets of counts that define the annual inventories and flows of individuals during the year. The categories in which counts were obtained are listed in Table 5. The table also lists the rates constructed from the counts.

TAPE MATCHING

The population counts and flows of individuals are defined by an individual's status on three tapes: the early fiscal year tape, the later fiscal year tape and the accession tape during the year. There are eight possible combinations to define an individual's status. For instance an individual could be present on the initial fiscal year tape and final year tape. We call this individual a survivor. Similarly an individual who is present on both the accession tape and end year tape is called an accession survivor.

Certain of the combinations rarely occur and some should not occur if recording keeping is accurate. For instance a person whose record appears on all three tapes is an "in and outer." This person would have been present at the beginning of the year, dropped out and reentered during the year, and stayed until the end of the year. This

Table 5
DATA ABBREVIATIONS

Total Population	TPOP, TP
Survivors	MSRV, SV
Switchers	MSWT, SW
Good Accessions	GACC, GA
Non-accessors	NACC, NA
In and Outers	INOT, IO
Total Accessions	TACC, TA
Accession Survivors	ASRV
Accession Switchers	ASWT
Accession Survivors + or 1	ASRV+, [1
Accession Switchers + or 1	ASWT+
Accession Survivors 0	ASRV0, [0
Accession Switchers 0	ASWT0
Adjusted Total Accessions	TACC.ADJ, TA.ADJ
Backward Continuation Rates	BR
Backward Continuation Rates—Adjusted	BR.ADJ
Forward Continuation Rates	FR
Forward Continuation Rates—Adjusted	FR.ADJ
Backward Accession Survival Rates	BA
Backward Accession Survival Rates—Adjusted	BA.ADJ
Forward Accession Survival Rates	FA
Forward Accession Survival Rates—Adjusted	FA.ADJ

sequence is possible, but rarely occurs. A combination that should not occur is an individual who appears only on the final fiscal year tape. This individual should have an accession record during the year if records are properly kept. We call this individual a non-accessor, and the number of non-accessors is an indication of the quality and accuracy of data records.

In addition to the individual's presence on each tape, it is also necessary to define changes in individual characteristics between tapes when defining population flows. For instance an individual can change from full-time status to part-time status during the year. This individual we call a switcher. It means he is still present, but changed status. We similarly define an accession switcher as someone who entered in one status, but changed status before the end of the year.

A similar problem occurs with the year of service characteristic. We expect the year of service to change by one year if an individual appears on the early and final fiscal year tape. However, an accession survivor with prior military experience can have the same year of

service or different year of service on the accession tape and final tape. For instance, a prior-service accession who enters with three years and nine months of prior service, and enters three months before the end of the fiscal year, will change YoS. If that person enters with less than three months before the end of the year, the YoS will not change. We thus get separate counts of accession survivors for those who do and do not change YoS.

Finally one of our models disaggregates by demographic characteristics, and it is possible for certain of these characteristics to change from the early tape or accession tape to the final tape. These changes can reflect a legitimate change of status. For instance, a person's education status will change if he obtains a high school diploma during the year. These changes can also reflect a change from missing or incorrect data to a correct designation. For instance, AFQT score may be missing from the early tape, but present in the final tape. Unfortunately this is not an uncommon occurrence in the Army, Marine, and Navy Reserves data.

The frequency of occurrence of changed characteristics on reserve tapes (a phenomenon we call cell hopping) mandated that some provision be included in the models to flag the occurrence of such changes. Otherwise these changes could be reflected improperly in continuation rates and could be propagated in projections. Accordingly, we developed and estimated two continuation rates within the models that bound the effect of table hopping. We call these rates backward and forward continuation rates. We define the backward continuation rate as the proportion of individuals present on the early tape in a cell who transition to any cell on the final tape. The forward continuation rate is the ratio of the number of individuals in the early cell to the number in the final cell. The forward rate counts individuals in the final cell regardless of their status on the earlier tape.

If no cell hopping is present, the two rates will be equal. The difference in the two estimates measures the extent of cell hopping for a given characteristic. For instance, if many reservists upgrade their educational status during a year, we may find that there are more high school graduate survivors in YoS 5 on the later tape than there were on the early tape in YoS 4. Obviously the additional high school graduates have "hopped" from the non-high school graduate cell. The backward continuation rate (which must always be less than or equal to one) would reflect only those who survived from the high school graduate cell on the early tape to the later tape. The forward continuation rate (which can be greater than one) would count all high school graduates in the later tape and divide by the number of high school graduates on the early tape.

Forward continuation rates should be used for projections if the phenomenon that causes cell hopping reflects actual and continuing changes in the characteristics of reservists. However, forward rates can be misleading if they reflect a one-time updating of missing data or other temporary occurrence that is not likely to continue into the future. In this case use of backward rates can be more appropriate. In general it is useful to project using both rates and determine the extent of difference. If this difference is large in a given application, it is necessary to look in some detail at the rates causing the differences and decide on whether the differences may be caused by bad or missing data or legitimate transitions. Generally, cell hopping is not a problem for the Air Force components and Army National Guard. It can be a problem—depending on the characteristics—for the Army Reserve, and is a severe problem for the Navy and Marine Corps Reserves.

The data sets generated for the four models are not exactly parallel in the counts obtained and the formulas used. Rather, they reflect the learning that occurred as we became more experienced with the quality of the data. The first data set obtained was the enlisted/disaggregated model, followed by the officer/disaggregated and finally the FT/PT/MT (Full-time/Part-time/Military Technician) models for both enlisted and officer categories. The enlisted/disaggregated group did not obtain accession counts into the same and different YoS, nor did it have the non-accessor counts. *Both of these were included in the officer/disaggregated model.* In the FT/PT/MT model we also obtained separate counts for accession and survivor switchers within the three categories.

The following tables and sections provide precise definitions of the counts and rates that are used in the models.

The headings and entries are defined as follows:

- Early tape—a fiscal year-end tape
- Late tape—the corresponding tape for the next fiscal year
- YoS tape—the tape that a given SSN's YoS is calculated from
- Yes—a particular SSN is on that tape
- No—a particular SSN is not on that tape
- Blank—that tape was not used to determine counts for that variable

Disaggregated—Enlisted

data abbrev.	early tape	accession tape	late tape	yos tape
TPOP			yes	late
MSRV	yes		yes	early
GACC	no		yes	late
TACC		yes		access
ASRV		yes	yes	access

Disaggregated—Officer

data abbrev.	early tape	accession tape	late tape	yos tape
TPOP			yes	late
MSRV	yes		yes	early
GACC	no		yes	late
NACC	no	no	yes	late
INOT	yes	yes	yes	late
TACC		yes		access
ASRV		yes	yes	access
ASRV+(1)		yes	yes	access

Full-time/Part-time/Military Tech.—Enlisted or Officer

(example: FT only)

data abbrev.	early tape	accession tape	late tape	yos tape
TPOP			FT	late
MSRV	FT		FT	early
MSWT	PT or MT		FT	early
GACC	no		FT	late
NACC	no	no	FT	late
INOT	yes	yes	FT	late
TACC		FT		access
ASRV0		FT	FT	access
ASRV+(1)		FT	FT	access
ASWT0		PT or MT	FT	access
ASWT+(1)		PT or MT	FT	access

Accession Survivor

An accession survivor is a reservist who is on both the accession tape and the end year tape. An accession survivor + (or 1) is an accession survivor who finished the year in the YoS that he accessed in plus one. An accession survivor 0 is an accession survivor who finished the year in the same YoS that he accessed in.

Accession Switcher

An accession switcher is a reservist who is on both the accession tape and the end year tape, but has changed among the full-time, part-time, or military technician designations. An accession switcher + (or 1) is an accession switcher who finished the year in the YoS that he accessed in plus one YoS. An accession switcher 0 is an accession switcher who finished the year in the same YoS that he accessed in.

Adjusted Total Accessions

Adjusted total accessions is the total accessions count as defined above adjusted for YoS hoppers, in and outers (subtracted), switchers, and non-accessors (added).

Backward and Forward Accession Survival Rates

The backward and forward accession survival rates are generated in the same way as the backward and forward continuation rates except using accession counts and survivors. Further, the associated "Adjusted" rates are adjusted for YoS jumpers, in and outers, and non-accessors as described under "Adjusted Total Accessions."

Backward Continuation Rates

The backward continuation rate is the number most often associated with the continuation rate. It is the number provided by DMDC as a continuation rate. It is generated by dividing the number of survivors by the population that they survived from (in other words, you look back to see how many people you started with). It is always between 0 and 1 or equal to 0 or 1.

Expiration-of-term-of-service—ETS status

A reservist is at ETS if he will have a reenlistment decision in the next fiscal year.

Forward Continuation Rates

In generating the forward continuation rate we look forward to see how many people we end up with and divide that by the number of people we have. This occasionally generates a number greater than 1 because of YoS jumping in the full-time/part-time/military tech. data, and because of cell jumping (reservists ending up in a different mental category or YoS, etc.) in the disaggregated data. All cell jumping except YoS jumping has been eliminated in the full-time/part time/military tech. data.

Good Accession

A good accession is a reservist who is on a year-end tape and is not on the preceding year's year-end tape. This group differs from accession survivors in that different tapes are matched, and the accession tape does not always include all accessions.

Good Years of History

The good years of history are those years (in the full-time/part time/military technician data) in which the FT/PT/MT designator is found on the RCCPDS tapes. It varies with component.

In and Outer

An in and outer is a reservist who is on both year-end tapes as well as the accession tape.

Non-accessor

A non-accessor is a reservist who is on a year-end tape, is not on the preceding year's year-end tape, and is not on that year's accession tape.

Prior Service—PS status

A reservist is considered to have prior service experience if he is listed on a transaction tape (an accession record) as having prior active duty or reserve service experience. Each available year-end tape was

matched backward against all available transaction tapes (accessions only) to find each reservist's PS status on his most recent accession record (e.g., the FY87 year-end inventory tape is matched against the FY87 accession records; for each match or reservist who accessed in that year, the PS status field is checked and that reservist is classified as PS, non-PS (NPS), or unknown; then the FY87 inventory tape is matched against the FY86 accession records, etc.). As a result the table of PS reservists is a triangular matrix. That is, we have good counts for nine years (FY79-FY87) for YoS <1, eight years (FY80-FY87) for YoS 1, seven years (FY81-FY87) for YoS 2, etc.

Regression Independent Variables

The table of independent variables currently contains values for youth unemployment (UNY) and a dummy for each fiscal year (DM8 for FY78, DM9 for FY79, etc.). The youth unemployment numbers are interpolated (to fiscal years) from the calendar year figures for young men and women 16-19 years old found in the *Economic Report of the President*, transmitted to the Congress in February 1988, p. 292.

FY	Calendar Year	Fiscal Year
77	17.8	
78	16.4	16.75
79	16.1	16.18
80	17.8	17.38
81	19.6	19.15
82	23.2	22.30
83	22.4	22.60
84	18.9	19.78
85	18.6	18.68
86	18.3	18.38
87	16.9	17.25

Survivor

A survivor is a reservist who appears on two succeeding year-end inventory tapes.

Switcher

A switcher is a reservist who changed among the full-time, part-time, or military designations sometime during the fiscal year.

Total Accessions

Total accessions are all reservists on the accession tape.

Total Population

A reservist is counted in the total population count if he appears on the year-end inventory tape.

Years of Service—YoS

Year of service (YoS) is the number of years of service a reservist has credited on his RCCPDS record as calculated by subtracting the pay entry base date (PEBD) from the date of record. YoS <1 is between 0 and 12 months of service as calculated in this manner.

Appendix B

EQUATIONS

HISTORIC INVENTORY MODULE

In the equations listed below, related equations are placed together without blank rows between. The first equation in each pair represents the real cell addresses, whereas the second equation represents the associated variable name and specification. BR(<1,78) refers to the YoS <1, fiscal year 1978 cell in the backward population continuation rates table. Refer to Table A.1 for further explanations of the abbreviations used in the equations below.

For all equations that span more than one YoS, such as for #??XXEAG:

$$\begin{aligned} \text{FR}(\text{FBN}<1,78) = \\ [\text{TPOP}(\text{FBN}1,79) - \text{GACC}(\text{FBN}1,79)] / \text{TPOP}(\text{FBN}<1,78) \end{aligned}$$

the aggregation YoS causes a change in the formula:

$$\begin{aligned} \text{FR}(\text{FBN}12,78), \text{FR}(\text{FBH}12,78), \dots, \text{FR}(\text{MWH}12,78) = \\ [\text{TPOP}(13,79) - \text{GACC}(13,79)] \\ / @\text{sum}(\text{TPOP}(\text{FBN}12,78) \dots \text{TPOP}(\text{MWH}12,78)) \end{aligned}$$

Similar changes occur for the YoS 30+, and YoS UNK categories. This is necessary to account for the loss of information required at an aggregation point.

In all cases where a denominator of an equation is 0 (zero) the actual formulas generate a string containing the numerator value and "/0", so the cell will appear to contain, for example, 3/0, but you should be aware that it is a string, **not** a number. Displaying the actual values of the numerator and denominator will help you to determine what value to use to replace the string.

The complicated method used to create the "adjusted" values for some accessions is not perfect. Occasionally a negative value can be generated when, for instance, the number of in and outers is larger than expected. In these cases, the actual formulas force the cell to contain the value 0 (zero).

Aggregated Data—Enlisted—file name #??XXEAG

$$V8 = B308 / B8$$

$$BR(FBN<1,78) = MSR(FBN<1,78) / TPOP(FBN<1,78)$$

$$V308 = (C16 - B616) / B8$$

$$FR(FBN<1,78) = [TPOP(FBN1,79) - GACC(FBN1,79)] / TPOP(FBN<1,78)$$

$$V608 = B1208 / B908$$

$$BA(FBN<1,78) = ASRV(FBN<1,78) / TACC(FBN<1,78)$$

$$V908 = B608 / C908$$

$$FA(FBN<1,79) = GACC(FBN<1,79) / TACC(FBN<1,79)$$

Aggregated Data—Officer—file name #??XXOAG

$$AW8 = L8 / B8$$

$$BR(F2<1,78) = SV(F2<1,78) / TP(F2<1,78)$$

$$BJ8 = (C14 - AF14) / B8$$

$$FR(F2<1,78) = [TP(F21,79) - GA(F21,79)] / TP(F2<1,78)$$

$$AX208 = V208 / (AF208 + V208)$$

$$[0R(F2<1,78) = [0(F2<1,78) / ([1(F2<1,78) + [0(F2<1,78)$$

$$BJ214 = W214 + AG208 + B214 - W14$$

$$AS.ADJ(F21,79) = [0(F21,79) + [1(F2<1,79) + NA(F21,79) - IO(F21,79)$$

$$BU214 = M208 * (1 - AY208) + M214 * AY214 + B214 - V14$$

$$TA.ADJ(F21,79) = TA(F2<1,79) * (1 - [0R(F21<1,79))$$

$$+ TA(F21,79) * [0R(F21,79)$$

$$+ NA(F21,79) - IO(F21,79)$$

$$CF208 = BJ208 / BU208$$

$$BA.ADJ(F2<1,79) = AS.ADJ(F2<1,79) / TA.ADJ(F2<1,79)$$

$$CQ208 = AF8 / BU208$$

$$FA.ADJ(F2<1,79) = GA(F2<1,79) / TA.ADJ(F2<1,79)$$

**Full-time/Part-time/Military Tech.—Enlisted—file name
#??XXEFT**

B669 =

$C369 * (J429 - B489) / J429$
 $+ C368 * B488 / J428$
 $+ C549 * (J549 - B609) / J549$
 $+ C548 * B608 / J548$
 $+ B189 + B128 - B309$

TACC.ADJ(1,79) =

$TACC(1,79) * [ASRV(1,86) - ASRV+(1,86)] / ASRV(1,86)$
 $+ TACC(1,79) * ASRV(<1,86) / ASRV(<1,86)$
 $+ ASWT(1,79) * [ASWT(1,86)$
 $- ASWT+(1,86)] / ASWT(1,86)$
 $+ ASWT(<1,79) * ASWT(<1,86) / ASWT(<1,86)$
 $+ NACC(1,79) + MSWT(<1,78) - INOT(1,79)$

B728 = (C9 - B249 - B128) / B8

FR.ADJ(<1,78) =

$[TPOP(1,79) - GACC(1,79) - MSWT(<1,78)] / TPOP(<1,79)$

B788 = B68 / B8

BR(<1,78) = MSRV(<1,78) / TPOP(<1,78)

B849 = (B249+B128) / B669

FA.ADJ(1,79) = [GACC(1,79) + MSWT(<1,78)] / TACC.ADJ(1,79)

B909 =

$[C429 * (J429 - B489) / J429$
 $+ C428 * B488 / J428$
 $+ C549 * (J549 - B609) / J549$
 $+ C548 * B608 / J548$
 $+ B189 + B128 - B309] / B669$

BA.ADJ(1,79) =

$ASRV(1,79) * (ASRV(1,86)$
 $- ASRV+(1,86)) / ASRV(1,86)$
 $+ ASRV(<1,79) * ASRV(<1,86) / ASRV(<1,86)$
 $+ ASWT(1,79) * [ASWT(1,86)$
 $- ASWT+(1,86)] / ASWT(1,86)$
 $+ ASWT(<1,79) * ASWT(<1,86) / ASWT(<1,86)$
 $+ NACC(1,79) + MSWT(<1,78)$
 $- INOT(1,79)] / TACC.ADJ(1,79)$

**Full-time/Part-time/Military Tech.—Officer—file name
#??XXOFT**

$$\begin{aligned}
 B669 &= + C369 * C429 / (C429 + C489) \\
 &+ C368 * C488 / (C428 + C488) \\
 &+ C549 + C608 + B189 + B128 - B309 \\
 TACC.ADJ (1,79) &= \\
 &TACC(1,79) * ASRVO(1,79) / [ASRVO(1,79) \\
 &+ ASRV1(1,79)] \\
 &+ TACC(<1,79) * ASRV1(<1,79) / [ASRVO(<1,79) \\
 &+ ASRV1(<1,79)] \\
 &+ ASWT0(1,79) + ASWT1(<1,79) + NACC(1,79) \\
 &+ MSWT(<1,78) - INOT(1,79)
 \end{aligned}$$

$$\begin{aligned}
 B728 &= (C9 - B249 - B128) / B8 \\
 FR.ADJ (<1,78) &= \\
 &(TPOP(1,79) - GACC(1,79) - MSWT(<1,78)) / TPOP(<1,78)
 \end{aligned}$$

$$\begin{aligned}
 B788 &= B68 / B8 \\
 BR (<1,78) &= MSRV(<1,78) / TPOP(<1,78)
 \end{aligned}$$

$$\begin{aligned}
 B849 &= (B249 + B128) / B669 \\
 FA.ADJ (1,79) &= (GACC(1,79) + MSWT(<1,78)) / TACC.ADJ(1,79)
 \end{aligned}$$

$$\begin{aligned}
 B909 &= (C429 + C488 + C549 + C608 + B189 + B128 - B309) / B669 \\
 BA.ADJ (1, 79) &= \\
 &[ASRVO(1, 79) + ASRV1(<1, 79) + ASWT0(1, 79) + ASWT1(<1, 79) \\
 &+ NACC(1, 79) + MSWT(<1, 78) - INOT(1, 79)] / TACC.ADJ(1, 79)
 \end{aligned}$$

**INVENTORY PROJECTION MODULE—FILE NAME
#PROXX**

continuers—to be found in cells BX10—BX264

$$\begin{aligned}
 \text{continuers}(\text{YoS } <1) &= 0 \\
 \text{continuers}(\text{Yos } 1 \text{ to } \text{YoS } 30 \text{ or } 40) &= \\
 &\text{previous population}(\text{YoS } <1 \text{ to } \text{YoS } 29 \text{ or } 39) * \\
 &\text{continuation rate}(\text{YoS } <1 \text{ to } \text{YoS } 29 \text{ or } 39) \\
 \text{continuers}(\text{YoS } 30+ \text{ or } 40+) &= \\
 &\text{previous population}(\text{YoS } 30 \text{ or } 40) * \\
 &\text{continuation rate}(\text{YoS } 30 \text{ or } 40) +
 \end{aligned}$$

previous population(YoS 30+ or 40+) *
continuation rate(YoS 30+ or 40+)
continuers(YoS unknown) =
previous population(YoS unknown) *
continuation rate(YoS unknown)

If a YoS has more than one row, then each row is calculated in like manner. Where aggregation of the rows in a YoS occurs between one YoS and the next, the formulas are adjusted to include all continuers from the appropriate rows.

required accessions

required accessions = @if(required strength < strength, 0,
required strength - strength)
BX267 = @if(BX266 < BX265, 0, BX266 - BX265)

(read the above as: if the required (end) strength is less than the current strength then no accessions are required. Otherwise, the required accessions are equal to the required strength minus the current strength.)

accession I ratio—the percentage of first choice accessions that will be used.

accession I ratio = @if(required accessions > total accession I, 1,
@if(total accession I = 0, 0,
@if(required accessions / total accessions I, 1,
required accessions / total accessions I)))
BX268 = @if(BX267 > CB265, 1,
@if(CB265 = 0, 0,
@if(BX267 / CB265 > 1, 1,
BX267 CB265)))

accession II ratio—the percentage of second choice accessions that will be used.

accession II ratio = @if(required accessions < total accessions I, 0,
@if(total accessions II = 0, 0,
(required accessions - total accessions I) /
total accessions II))
BX269 = @if(BX267 < CB265, 0,
@if(CC265 = 0, 0,
(BX267 - CB265) / CC265))

next year's population—to be found in cells BY10—BY264

next year's pop. = continuers + accession I ratio * accessions I
+ accession II ratio * accessions II

Appendix C

CURRENT AGGREGATION AND WORKSHEET LAYOUTS

The aggregation schemes listed below are the schemes that we developed for doing projections with the "disaggregated" data set (as opposed to the full-time/part-time/military technician data set) with this model. It takes into consideration the effect of each aggregate on a projection, the limitations of the model (mostly memory limits), and the limitations of the data set.

The totally disaggregated data set includes many cells that are zero. Since this causes difficulties in calculating rates, we attempted to choose an aggregation that would minimize the number of zero cells for all six components.

ENLISTED

- Sex (female, other); YoS <1-12
- Race (black, other); YoS <1-12
- Education (non high school grad, other); YoS <1-12
- YoS only; Yos 13-30, 30+, and unknown

OFFICER

- Sex (female, other); YoS <1-15
- DoD occupation code (2a-2d, 6a-6h, other); YoS <1-30, 30+, and unknown

DoD occupation code 2a-2d represents pilots and flight officers, and 6a-6h represents, primarily, doctors and nurses.

The following worksheet layouts show the location of the major parts of each worksheet. The letters across the top refer to 1-2-3 column names, and the numbers on the left are 1-2-3 row numbers.

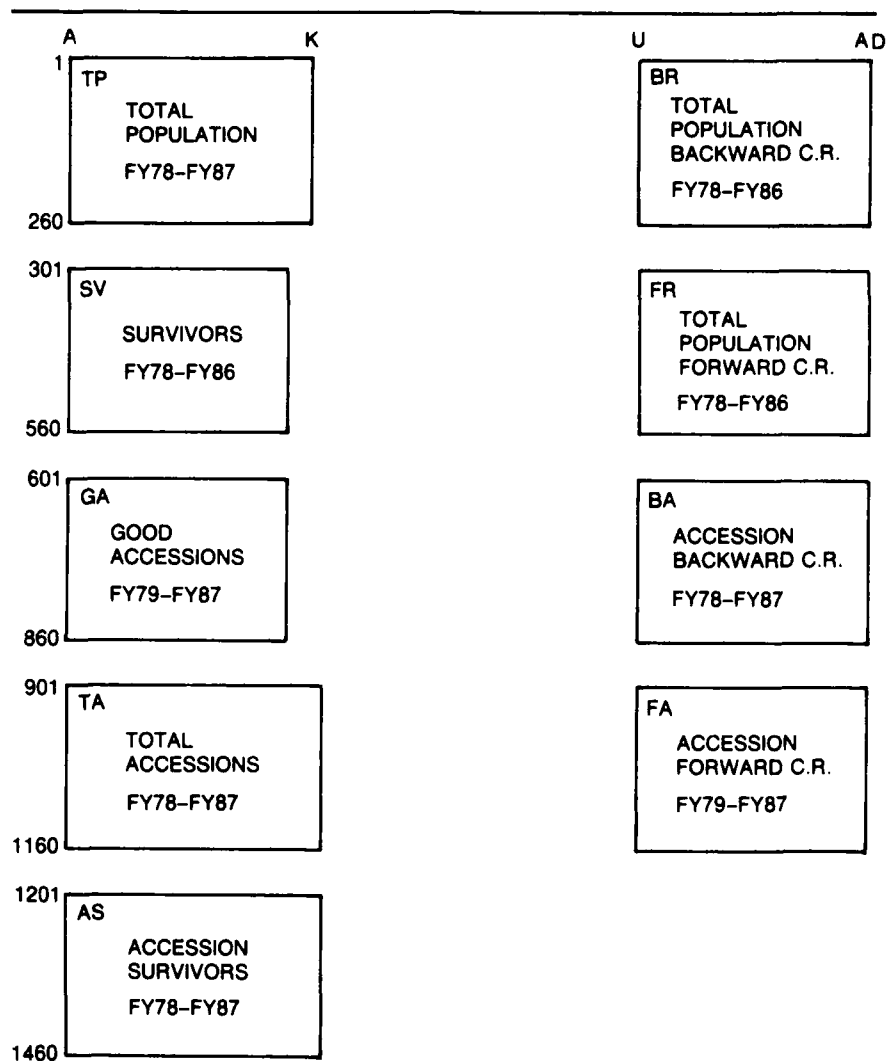


Fig. 47—HISTORIC INVENTORY MODULE—Aggregated Enlisted data—file name #??XXEAG

A	L	M	X	Y	AJ	AK	AV	AW	BH	BI	BS
1	TP 78-87	SV 78-86	IO 79-87	GA 79-87	BR 78-86	FR 78-86					
155											
201	NA 79-87	TA 78-87	(asrv0) [0 78-87	(asrv1) [1 78-87	(asrv0 rates) [0R 78-87	AS.ADJ 79-87	TA.ADJ 79-87	BA.ADJ 79-87	FA.ADJ 79-87		
355											

Fig. 48—HISTORIC INVENTORY MODULE—Aggregated Officers
data—file name #??XXOAG

1	A	FT	L	M	PT	X	Y	MT	AT
61	TPOP	78-87							
121	MSRV	78-86							
181	MSWT	78-86							
241	NACC	79-87							
301	GACC	79-87							
361	INOT	79-87							
421	TACC	78-87							
481	ASRVO	78-87							
541	ASRV1	78-87							
601	ASWTO	78-87							
661	ASWT1	78-87							
721	TACC.ADJ	79-87							
781	FR.ADJ	78-86							
841	BR	78-86							
901	FA.ADJ	79-87							
960	BA.ADJ	79-87							

Fig. 49—HISTORIC INVENTORY MODULE—Enlisted Full-time/
Part-time/Military Tech. data file name #??XXEFT

	A	FT	L	M	PT	X	Y	MT	AT
1									
61	TPOP	78-87							
121	MSRV	78-86							
181	MSWT	78-86							
241	NACC	79-87							
301	GACC	79-87							
361	INOT	79-87							
421	TACC	78-87							
481	ASRVO	78-87							
541	ASRV1	78-87							
601	ASWTO	78-87							
661	ASWT1	78-87							
721	TACC.ADJ	79-87							
781	FR.ADJ	78-86							
841	BR	78-86							
901	FA.ADJ	79-87							
960	BA.ADJ	79-87							

Fig. 50—HISTORIC INVENTORY MODULE—Officer Full-time/
Part-time/Military Tech. data file name #??XXOFT

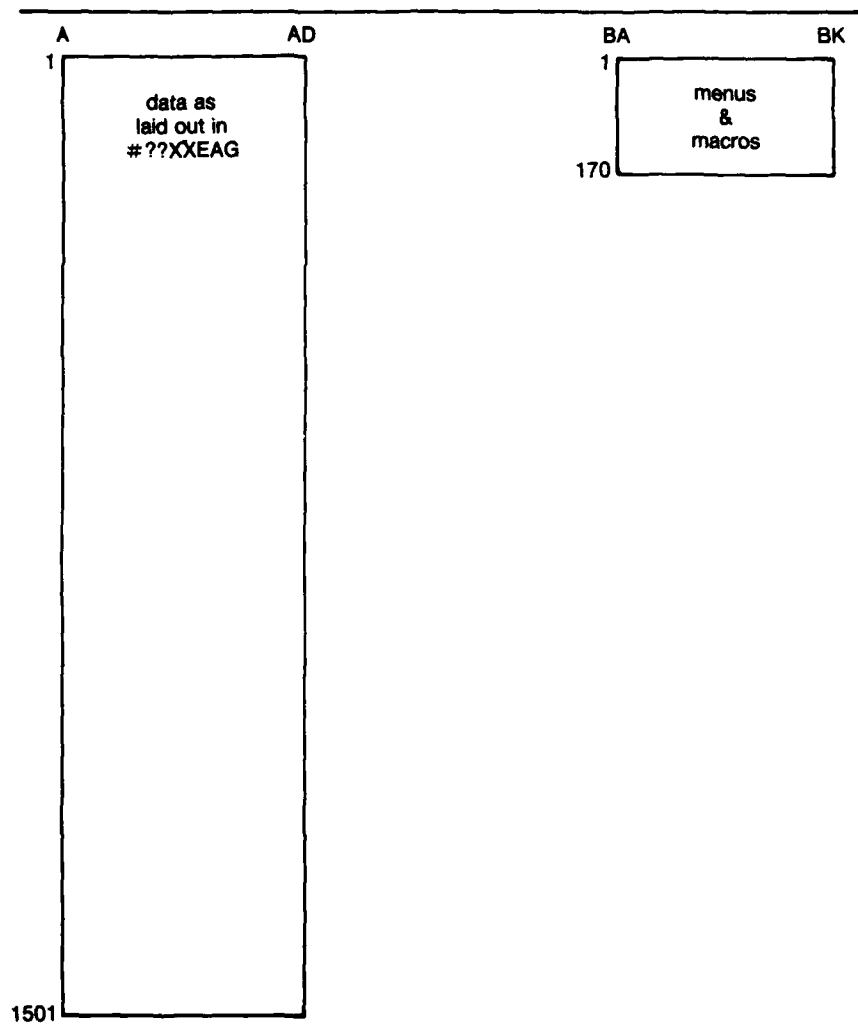


Fig. 51—HISTORIC INVENTORY MODULE—YoS breakouts—
Aggregated—Enlisted—file name #HIS1EAG

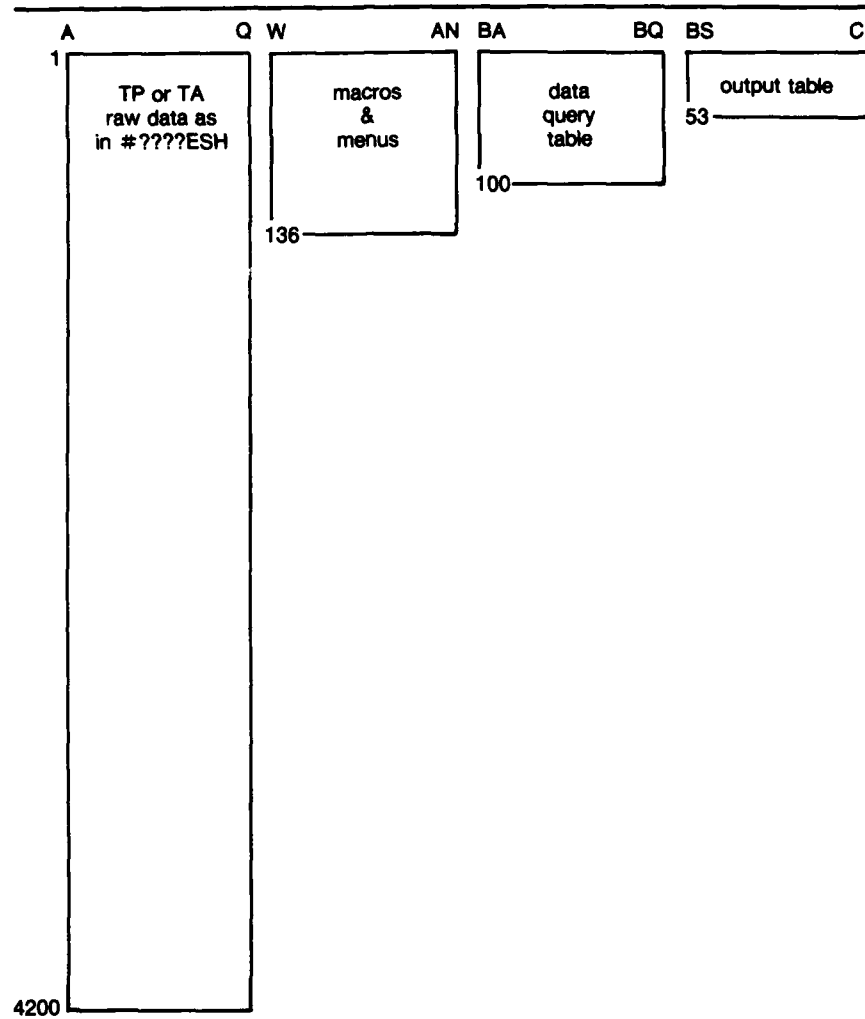


Fig. 52—HISTORIC INVENTORY MODULE—YoS breakouts—
Disaggregated—Enlisted—file name #HIS2EAG

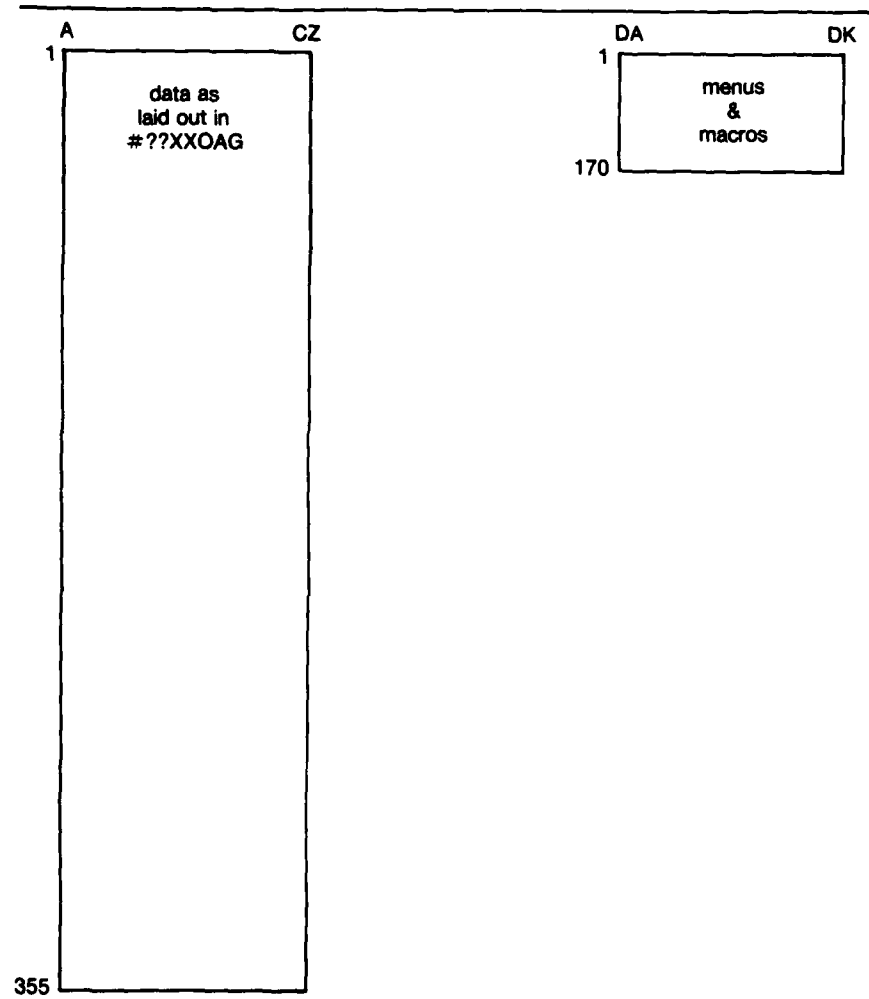


Fig. 53—HISTORIC INVENTORY MODULE—YoS breakouts—
Aggregated—Officers—file name #HIS1OAG

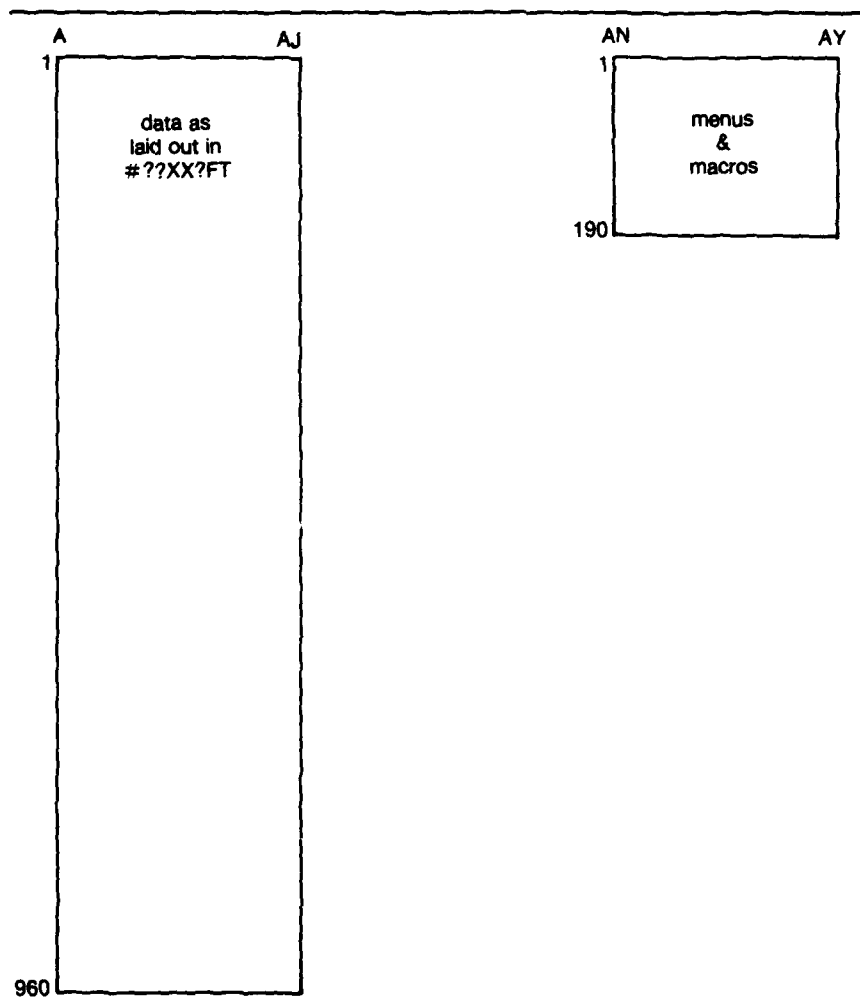


Fig. 54—HISTORIC INVENTORY MODULE—YoS only—
Full-time/Part-time/Military Tech.—file name #HISXXFT

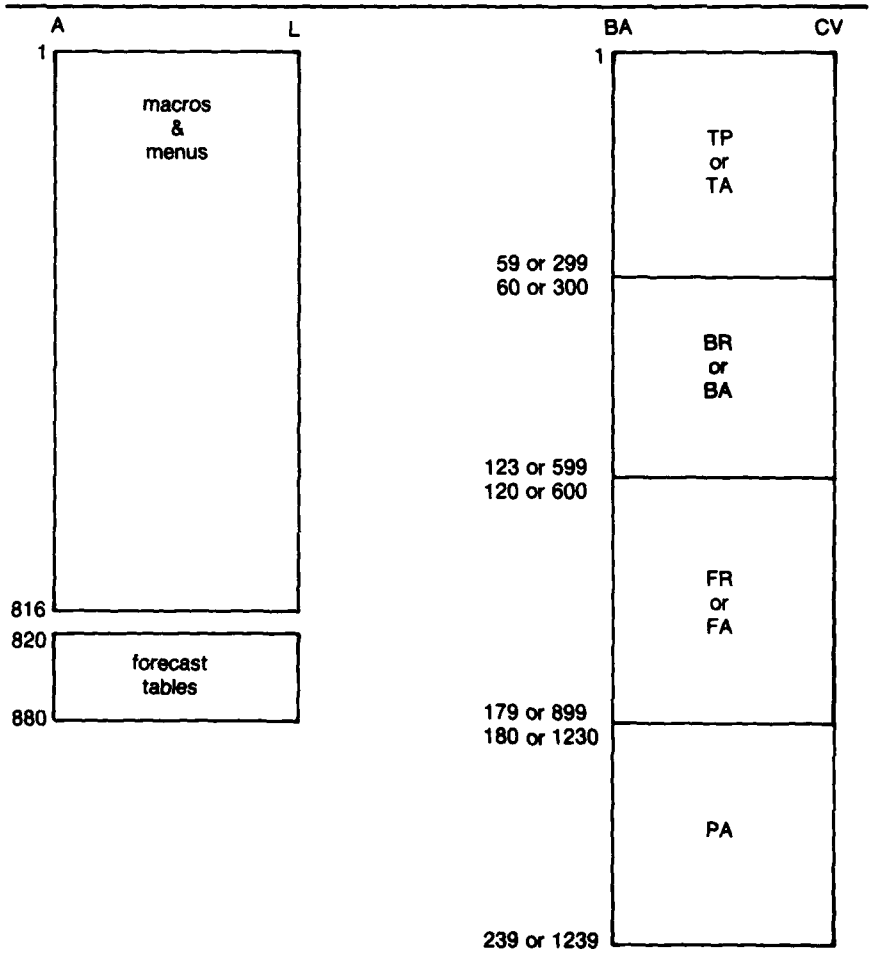


Fig. 55—DECISIONS MODULE—file name #DECXX

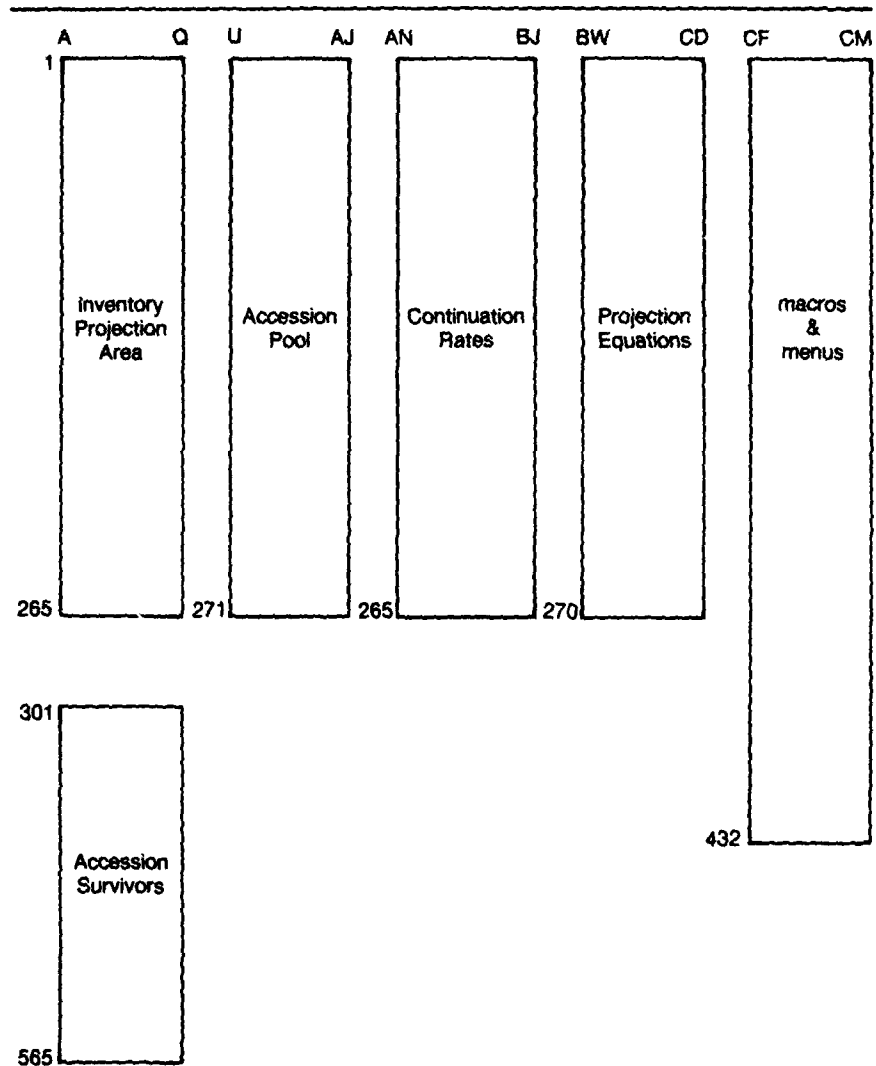


Fig. 56--INVENTORY PROJECTION MODULE--
file name #PROXX

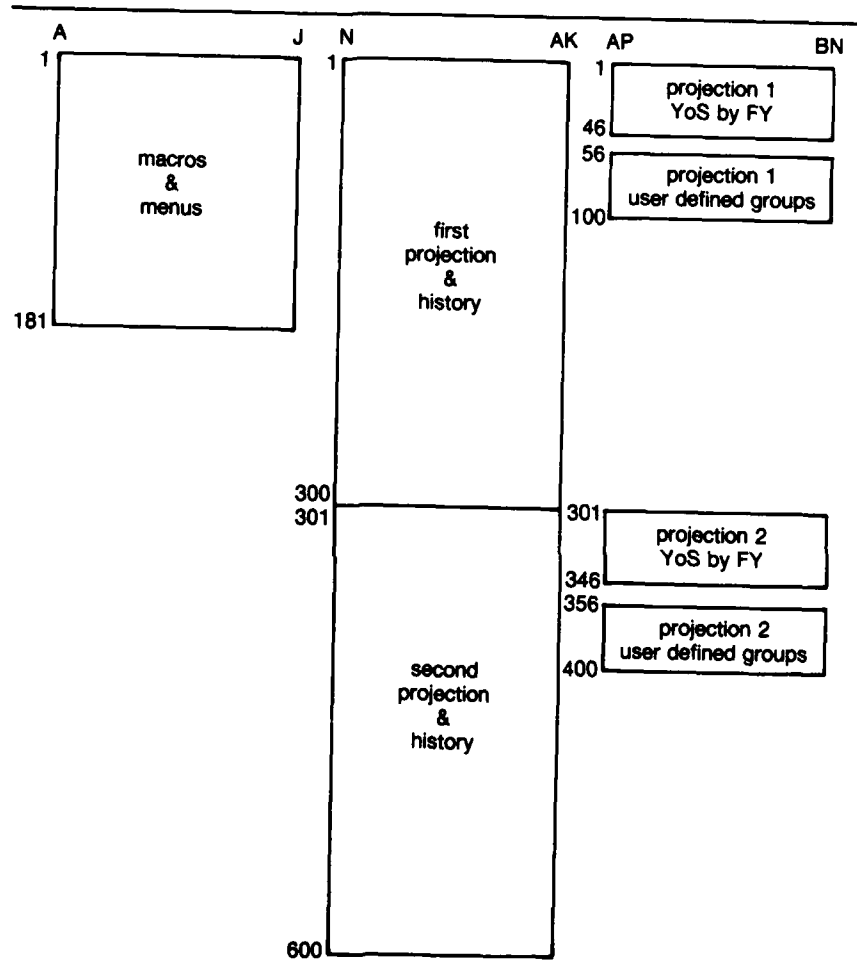


Fig. 57—REPORTING MODULE—file name #RPTXX

Appendix D

FORECASTING IN THE DECISIONS MODULE

SIMPLE RAMP

Simple Ramp calculates a long-term constant projection value, and then graduates or "ramps" from the last FY of historical data to that long-term value. The long-term value is defined as a simple function of any sequence of historical values. The user may define any simple function recognized by LOTUS, such as average, standard deviation, maximum, or minimum. For convenience the following commonly used functions are menu choices:

- average (user specified range)
- average \pm h + standard deviation (user specified range)
- maximum (user specified range)
- minimum (user specified range)

The menus ask you to decide what statistic to use, how many years into the future to make the ramp, and how many contiguous rows of your table to work on. Then the forecasts are automatically made, installed, and documented in the METHOD column of your table.

REGRESSION

Regression develops a linear or logistic regression formula based on designation of independent variables and fits to historical data. It then uses the future values of the independent variables to develop forecasts. You would use regression, of course, in case you can develop sound regression fits and also get a good forecast of independent variables. This regression routine is a tailored extension of the 1-2-3 data regression calculation.

Logistic Regression

When you forecast a fraction such as a continuation rate your independent variable, Y , can be transformed to the "log of the odds ratio," $\log(Y / [1 - Y])$. If you choose this option, the transformed variable will be regressed and then the inverse transformation will calculate your original variable, Y , confined to lie between 0 and 1.

Designation of Independent Variables

Since you may want to use one or two variables from a table of 20 variables, you are asked to mark the variables you select. This mark is either an asterisk, to allow Ordinary Least Squares determination of the best-fitting coefficient, or a specific number that will be forced to be your coefficient.

Forcing Independent Variables

In your forecasting formula, you may choose to force specified coefficients for some independent variables (because you know a coefficient better than that which Least Squares can fit for you). The model automatically does this forcing for you whenever you place a number under an independent variable during your selection process. Thereupon, the forced portion of the formula is automatically deducted from your dependent variable, to be restored after the asterisked variables have been fit by the Least Squares technique.

Changing the Independent Variables

The independent variables are located in a separate worksheet and may be easily changed by the user. These changes will be "permanent" until the user changes them again.

To make the changes you must leave the model and retrieve the 1-2-3 worksheet file INDPEVAR.WK!. The matrix of variables displayed in this worksheet must be 20 columns wide (located in columns A through T) and 32 rows long (rows 1 through 32). To add a new variable you should put it over one of the old ones. Although these data include fiscal years 1971 through 2000, only the FY78 through FY00 rows will be used for the Reserve Force POSM; the other rows are used in the Active Component POSM.

EXPONENTIAL SMOOTHING

Exponential smoothing is a popular method, but still a controversial one, for automatically smoothing a time series. The model version of this method uses a standard approach known as "Exponential Smoothing Adjusted for Trend."

If the user were already fully familiar with exponential smoothing, we would mention only that the model uses the first actual point as its own smoothed value; 0 as the first estimate of slope; then brute strength optimizes over nine choices of the smoothing constants (0.1,

0.2, 0.3 for the trend and 0.1, 0.2, 0.3 for the slope of the smoothing constant).

The reader who is not fully comfortable with exponential smoothing would enjoy Hillier and Lieberman's discussion.¹

By manipulating the actual formula used in smoothing, several reassuring interpretations appear: If we refer to the original sequence as $x(t)$ and the smoothed version as $s(t)$, the formula is:

$$s(t + 1) = \alpha x(t + 1) + (1 - \alpha)s(t).$$

therefore,

$$s(t + 1) = \alpha x(t + 1) + \alpha(1 - \alpha)x(t) + \alpha(1 - \alpha)^2 x(t - 1) + \dots;$$

and this reveals $s(t)$ as assigning exponentially lower weights $(1 - \alpha)^n$ to the farther back values of $x(t)$.

Alternatively, rewrite

$$s(t + 1) = s(t) + \alpha[x(t + 1) - s(t)],$$

and you see that s is the preceding smoothed value with an adjustment toning down the actual adjustment by multiplying it by α .

Hillier and Lieberman also mention that the variance of the exponential smoothing of a stable sequence, $s(t)$, is the same as the variance of a moving average with $(2 - \alpha)/\alpha$ observations. This helps to suggest that α should be restricted to a moderate range, which Hillier and Lieberman quote as being up to 0.3.

In the model to choose α (or alpha) and the corresponding slope weight, β (or beta), we merely offer 0.1, 0.2, or 0.3 for each and brute-strength calculate which of these nine combinations produces the smallest sum of the squared-errors for the historical sequence at hand.

¹Frederick S. Hillier and Gerald J. Lieberman, *Introduction to Operations Research*, Holden-Day, Inc., San Francisco, California, 1980.

Appendix E

A FILE NAMING CONVENTION

Techniques for naming files are as diverse as people are. As you use the model you will find that you create a large number of files. Having the ability to create subdirectories to contain your files will help you remember what is in them, but only to a certain degree. The following is a convention for naming files that you may wish to use.

You may use eight characters for any file name and another three characters for the file extension. If you give a file extension other than the default (.wk! with SQZ!), though, the files will not be "squeezed" by the SQZ! software and, so, will take more disk space. So, try to give the files names that identify what the files are using only eight characters. For instance, let the first character represent the module that the file was created in:

- H—HISTORIC
- D—DECISIONS
- P—PROJECTION
- R—REPORTING

Let the second and third characters represent the reserve component:

- AG—ARNG
- AR—USAR
- FG—ANG
- FR—USAFR
- NR—USNR
- MR—USMCR

Let the fourth character represent the category:

- E—Enlisted
- O—Officer

Let the fifth character represent the type of reservist:

- F—Full-time
- P—Part-time
- M—Military technician
- D—Disaggregated

Let the sixth character represent

- A—Accessions
- P—Population

That leaves two characters to identify any variations in the tables that you may have made. Since these variations could be numerous, we recommend that you use numbers such as 00, 01, 02, etc. This will allow you 100 possible variations.

As an example, you may do a "run" in the DECISION MODULE where you use several different methods of forecasting total accessions and forward accession survival rates for the ARNG part-time officers. These files could be called DAGOPA00 or DAGOPA01 for the accessions file, and DAGOPP00 or DAGOPP01 for the population continuation rates table. You should, of course, keep a record of what those last two characters represent.

Again, you are not required to use this method of naming files, but it may give you some ideas for developing your own file-naming convention.

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